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ORIGINAL ARTICLES

SOME OBSERVATIONS ON THE FEEDING OF PREMATURE INFANTS BASED ON TWENTY YEARS' EXPERIENCE AT THE NEW HAVEN HOSPITAL

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THE Borden Award for 1944 was worthily bestowed upon Drs. Levine and Gordon of Cornell Medical School. In the address of acceptance, the recipients mentioned briefly a study being carried out at that time in New York Hospital. Isocaloric amounts of different diets were fed to premature infants in groups in rotation and under the same medical, nursing and environmental conditions; these diets, it was stated,[1] were "human milk, a simple evaporated milk mixture and a half-skimmed milk mixture, similar to the one originally recommended by Powers." A chart was shown demonstrating the excellent results obtained with an infant weighing 662 gm. fed on a skimmed milk mixture.

Reporting on this study Gordon, Levine and McNamara[2] stated that: "A feeding mixture of partially skimmed milk such as the one in this study has been used successfully by Powers for many years in the routine feeding of premature infants." And the reference to the quotation reads: "Powers, G. F., unpublished data."

Thus, although somewhat as an anticlimax to the comprehensive and precise laboratory studies of Gordon and Levine,[3] I thought it both obligate and appropriate to set forth on this occasion the developmental course and results, based on clinical observation, of our manner of feeding infants, including premature infants, in the New Haven Hospital; and to report a few relevant findings from a special statistical analysis of some of our records made in the U. S. Children's Bureau.

In 1925, under Dr. Park's inspiration, I analyzed a number of food mixtures commonly used in infant feeding both currently and in the past.[4] The analyses were based on the percentage of the total calories in protein, carbohydrate and fat; concentration was indicated by the calories per cubic centimeter. No attempt was made to break down the data regarding protein and fat into caloric percentage values of their fundamental constituents.

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It is my opinion now, as in 1925, that analyses of infant diets are most clearly and basically expressed in this relationship to the calorie—the unit by which energy metabolism is measured. The calorie serves in this respect as a common denominator for the evaluation of protein, carbohydrate and fat and as a unit of reference for quantitative evaluation of water and mineral constituents of diets. Gravimetric percentage analyses, on the other hand, are dependent upon a unit of weight which does not bring out unequal metabolic values of protein, carbohydrate and fat, and fluctuates in a fluid medium with reference to another food constituent—water. Water in its own right is quantitatively related to energy metabolism and body structure, but so far as other food elements are concerned serves principally as a solvent and mechanical adjuvant.

Analyses in terms of percent of total calories bring out clearly how addition or subtraction of any food essential shifts the quantitative caloric relationship of every other

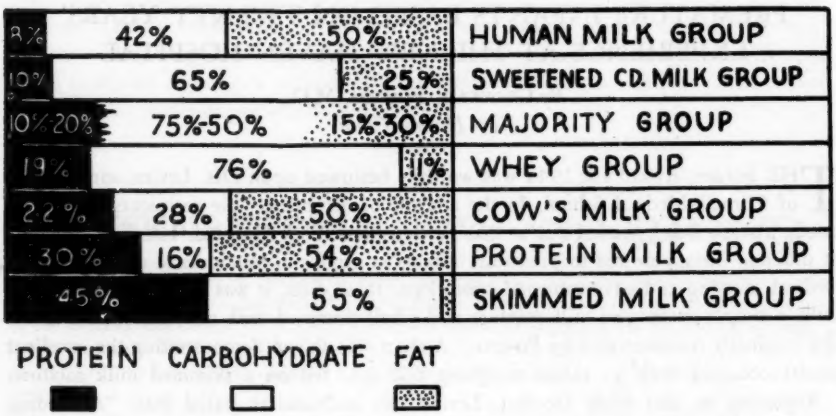

CHART 1: Groups are shown into which milk mixtures commonly used in infant feeding (1925) may be assembled according to similarity in their percentage distribution of protein, carbohydrate, and in the total calories.

food essential in the diet. For example, if fat in the diet is reduced, the proportions of total calories in protein and carbohydrate are each increased. Also, metabolic likenesses and variations in dietaries are not demonstrated when requirement is expressed as the amount by weight or by volume per kilogram of body weight. As an example of the obscuring nature of gravimetric terminology in this respect, let us take food requirements listed by the National Research Council[5] for protein in sedentary male adults weighing 70 kg. and in babies under one year. For adults it is stated the diet should contain 1 gm. of protein per kilogram of body weight and for infants, over twice as much (2.2 to 3.5 gm./kg.). Actually, the proportion of total calories in protein of the two diets as prescribed is essentially the same (11.2% in adults and 8.8% to 14% in infants) and the metabolically significant variable is not grams of protein per kilogram, but total caloric intake—35.7 calories per kilogram in the sedentary male adult and 100 calories per kilogram in the infant.

A recent study by Johnson and Kark[6] demonstrated that in the arctic or in the tropics the percent of total calories in protein, carbohydrate and fat taken voluntarily by soldiers

is essentially the same (average 12%, 50% and 38% respectively), but the total caloric intake varied from 4400 to 3200. The proportions of the food elements are those suggested by Holt and Fales in 1922 for children after infancy.

The principal result of my study[4] as to infants' dietaries is shown in Chart 1 to the effect that the most widely used milk mixtures were those in which about 10% to 20% of the total calories were in protein, 15% to 30% in fat and 50% to 75% in carbohydrate. This is essentially the caloric percentage pattern of whey, of a mixture of ⅓ whole milk, ⅔ water, 5% sugar, and of sweetened condensed milk. Despite almost universal official condemnation as a food lacking vitamins and food essentials in proper proportions, sweetened condensed milk was widely used—often surreptitiously by both physicians and mothers—in feeding infants. There must have been a very good reason for the prevalence of the practice in the face of professional opposition; namely, the majority of infants gained more satisfactorily and had fewer digestive difficulties on this milk mixture,

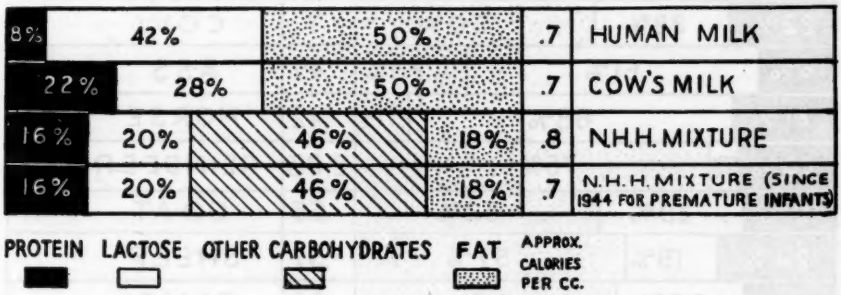

CHART 2: Approximate caloric value per cc. and percentage distribution of protein, lactose, added carbohydrate and fat in the total calories in standard milk mixtures used in New Haven Hospital. For comparison, the same data are shown for human milk and cow's milk.

supplemented with vitamins C and D, than on others in which it was and had been in competition. One asked, what are the characteristics of this milk mixture to which successful nourishment might be attributed? They were these: well-cooked, relatively high carbohydrate, low fat and concentrations of higher caloric values than most foods in common use in the early years of my pediatric experience—1913 to 1925. Those were the days when the value of vitamins A, C and D was being established in infant nutrition and when cow's milk proteins were being regarded as biologically poorer than those of human milk; therefore, it was suggested that more cow's milk protein should be given than was present in human milk.

It seemed reasonable, therefore, to feed babies, who could not be nursed by their mothers, cow's milk mixtures well cooked, low in fat, high in carbohydrate, higher in protein than sweetened condensed milk, abundant in calcium and phosphorus, and administered in concentrations not lower than human milk. Cow's milk containing 2% fat to which 10% sugar was added met these requirements. The increased protein is desirable to meet quantitative rather than qualitative requirements. Such milk mixture, of course, would be inadequate in vitamins C and D. These would be supplied by orange juice and cod liver oil. There was some experimentation with acid milks, but after acidification failed to show any special virtues, it was given up.

A passing remark made by Professor Lafayette B. Mendel upon the known and probably many unknown nutritional virtues of liver, both the extract and the whole organ, led us to its use in feeding all premature infants and all patients presenting nutritional disturbances.

Thus, roughly twenty years ago, the following practice became established as routine on the pediatric service of the New Haven Hospital: all infants not breast fed and not receiving human milk are fed a mixture of 70 gm. powdered whole milk, 50 gm. powdered skimmed milk, 100 gm. dextrimaltose, and water to 1000 cc. This gives a food relatively high in protein, carbohydrate and minerals and low in fat. The percentages

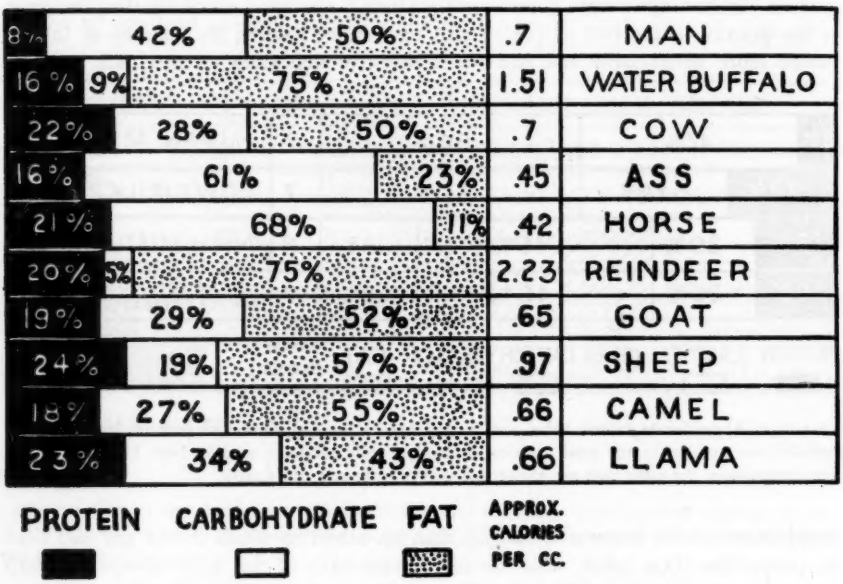

CHART 3: Approximate caloric value per cc. and percentage distribution of protein, lactose and fat in the total calories in the milk of various domesticated animals.

of total calories in protein, lactose, added carbohydrate and fat are respectively 16%, 20%, 46% and 18%, as shown in Chart 2. The caloric value is 88/100 cc. (somewhat higher according to current analyses). For the normal infant, food essentials in these proportions and in this concentration may not be matters of great importance; but for the newborn, the feeble, the malnourished, the febrile, the convalescent, the infant without organic disease prone to vomit, this food, in our experience, is the one which can be assimilated by the infant with little digestive disturbance, if any food at all can be tolerated.[7] One may be reminded here that the first natural food to which the infant must adjust, colostrum, has a higher proportion of the total calories in protein and lower proportions in fat and sugar than are found in mature human milk.

We believed twenty years ago that all premature infants, regardless of weight, should be fed human milk; but our standard cow's milk mixture was used when human milk was

not available. To our surprise, we noted after a period of years that the premature babies seemed to thrive more satisfactorily, as judged by growth and freedom from digestive disturbances, on the artificial milk mixture, with liver and vitamin supplements, than on human milk with the same supplements.

Parenthetically, at this point, there are two relevant studies to which I would direct attention.

In 1933 I made an analysis[8] of animal milks used in infant feeding in various parts of the world as to the percent of total calories in protein, lactose and fat. These analyses are shown in Chart 3. I present them here in order to demonstrate the similarity between the caloric percentage pattern of asses' milk to that of the mixture which we have found useful. There are many references in the literature to the virtues of asses' milk in infant feeding, these, despite the low concentration of the food—45 calories per 100 cc. I quote a single statement—one from George Armstrong,[9] founder of the first Dispensary for the Infant Poor in Britain. Writing in 1783, he said, "If the infant is to be bred up by hand from the birth, it ought to have new cow's milk" (I presume he meant fresh whole milk, unboiled) "mixed with its victuals as often as possible, and now and then some of it alone to drink. Asses' milk will be still better, when it can be conveniently had, and the parents can afford it."

The other parenthetical, but relevant, item is a study made by Harrison.[10] He found in balance studies on five normal infants that the retentions of nitrogen, calcium and phosphorus were adequate in babies fed 100 to 120 calories per kilogram of diluted sweetened condensed milk. His data do not support the commonly expressed opinion that this mixture is inadequate in protein, and lend credence to the suggestion that past difficulties ascribed to feeding with sweetened condensed milk were due rather to inadequate vitamin intake.

There is nothing new in the use of a milk mixture such as I have described in the feeding of premature infants. German pediatricians for years advocated breast milk for premature infants; and, if this were not available, many of them used buttermilk with added starch and sugar. For babies in the older and the larger weight groups they added butter. Even among the babies who received human milk some feedings of the buttermilk mixture were often introduced. Says Finkelstein,[11] for example, "If one has to wait too long for spontaneous improvement," (i.e. gain in weight) "usually the addition to the breast feedings of one bottle of a mixture of suitable composition, or of a few grams of protein powder with nutritional salts, brings about the desired effect, probably because these additions take care of the increased nutritional needs of these abnormally vigorously growing individuals. In any case, for the slowly developing premature, feeding of two kinds of milk brings about the most satisfactory development. Of the milk mixtures used buttermilk with a moderate amount of sugar added is the most suitable food."

Ylppö[12] and other clinicians have sometimes used skimmed breast milk with carbohydrate added to it.

Most contemporary authorities[13, 14, 15] who advocate human milk for the nourishment of premature infants also suggest its reinforcement—usually by adding protein powder or skimmed milk (sweet or sour) or skimmed milk powder. Human milk, as demonstrated in part in Chart 3, differs strikingly from other milks in three characteristics —low protein, high fat and low mineral content. Many studies have shown that even for normal infants the protein of human milk is minimal and the optimum amount is not,

I think, established; but, judging from our clinical experience, the value may be around 15% of the calories.*

Increasing artificially the protein content of human milk changes the relative amounts of carbohydrate and fat—a point I emphasize again. This is shown in Chart 4, in which is graphed the percentage distribution of total calories in various human and cow's milk mixtures advocated for nourishment of premature infants. The so-called Dutch Infant's Food was favorably regarded by many European pediatricians for short-term nourishment of feeble and premature babies. The food is buttermilk to which sugar and flour are added. The mixture is inadequate in fat. There are proprietary diets for premature infants, rich in protein, but containing at least 30% of the total calories in fat and usually less than 50% in carbohydrate.

The use of cow's milk, or any protein derivative of cow's milk, usually enriches the resulting food in all the salts of milk, particularly calcium and phosphorus which, along with nitrogen, the premature must have more abundantly than in the amounts present

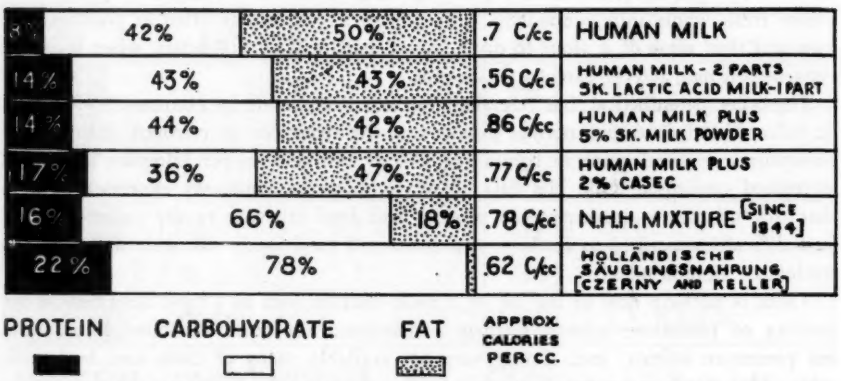

CHART 4: Approximate caloric value per cc. and percentage distribution of protein, carbohydrate and fat in certain diets used in the feeding of premature infants.

in human milk, if he is to maintain his required rate of growth. McCance and associates[17] have shown in adults that increasing the protein intake raises the amount of calcium and magnesium absorbed from the gut.

Magnusson and colleagues[18, 19] have added "Aminosol"—glucose mixtures to human milk in proportions varying from 1:20 to 1:10. The added material is composed of an

* Slonaker[16] has studied in rats the effect of different diets varying in protein content on growth, resistance to disease and efficiency of certain physiologic functions. Five diets were used, the protein contents of which were respectively 9%, 12%, 15%, 18% and 21% of total calories. Correlation of protein intake with biologic characteristics showed considerable irregular dispersion except in the following consistent results:

(1) Group I animals (9% of calories in protein) required the greatest number of days to reach maximum weight; and Group V animals (21% of calories in protein) the fewest.

(2) Group I animals attained the shortest body length, and Group V the longest.

(3) The weight of offspring at birth was greatest in Group III animals (18% of calories in protein) and least in Group I animals (9% of calories in protein).

(4) The rate of growth of offspring was least in Group I and in general showed an increased rate with the addition of protein to the diet.

amino-acid mixture made from hydrolysed casein, 25% and glucose, 25%. Premature infants, when fed on reinforced human milk, gained more rapidly than when fed on pure human milk. In this type of adulterated human milk the proportions of total calories in protein and sugar are higher and proportions in fat lower than in pure human milk. It is reported that Magnusson is experimenting with hydrolysed human milk protein as an adjuvant to human milk. I can well believe that the results with these foods are good; but reinforced human milk is not human milk, and use of the mixtures described by Magnusson are in contradiction to his statement that, "breast milk seems, in fact, to be one of the essentials for a low mortality in this group" (i.e. prematures).

At Darrow's[20] suggestion, we modified slightly our stock food for premature infants late in 1944 (Chart 2). Since that date, 2 cc. of a 6% solution of sodium citrate and 15 cc. of water and vitamin supplements are added to each 100 cc. of the original half skimmed milk mixture; the caloric value is reduced from 88 to 78/100 cc. (approximate). The sodium citrate increases the sodium in the food so as to make it about equivalent in amount to chloride; there is evidence that premature infants sometimes have difficulty in excreting the excess acid of cow's milk.[21, 22, 23] Water was added to the mixture so that the nurses would not be obliged to offer water between feedings. In certain feeble babies the original, more concentrated food may be used and necessary fluid given parenterally.

Starting at 30 calories per kilogram during the second 24 hours of life, the intake is gradually increased until the amount given on and after the fourteenth 24-hour period is 120 to 130 calories per kilogram. Medicine dropper or nipple feedings are practiced, but rarely gavage for longer periods of time than three days: in this matter we are probably too conservative. The feeding interval varies, but is usually three hours. Further details of medical care and feeding are given in the addendum.

I shall now direct your attention to an appraisal of some of our results in the care of premature babies in the New Haven Hospital. We have been continuously inspired in this matter by Dr. Ethel C. Dunham, a member of our staff, who in 1936 under the sponsorship of the Children's Bureau visited 100 hospitals in 27 large cities "to obtain a general idea of methods commonly used in the care of premature infants and of the results obtained." Although a great variety of methods of care were in use in the different hospitals, in only four had an evaluation of any methods been made on the basis of morbidity or mortality. A number of the hospitals, however, later compiled their statistics and reported a mortality varying all the way from 18% to 94%.[24] We are all under heavy debt to Dr. Dunham and the Children's Bureau for the stimulus which has come from them for knowledge of and better care of premature infants, and for continuous study of the problem.

Mortality rates are only one measure—and an inadequate one—of evaluating premature care and feeding. Our own figures are small and thus sensitive to wide fluctuations. In appraising statistical data (especially from small clinics) two points should be emphasized: (1) that the listing of deaths of a few additional infants weighing under 1000 gm. (a wholly natural phenomenon bound to happen in certain years) whose survival is rarely to be expected, raises the mortality rate to a falsely alarming degree. And (2) the inclusion of the records of a few infants brought to the hospital but not born in it is likely on occasion to raise survival rates in an unjustifiably favorable manner. Such infants are usually pretty hardy, else they would not have lived to be admitted to the institution. Some nurseries for premature infants receive a large proportion of

their population from institutions other than the one in which the nursery is located. Obviously, such nurseries may not get the feeble infants who live but a few minutes or hours, and the mortality rates are correspondingly, but artificially, good. Still other nurseries get only the tiny prematures or else only those in the larger weight groups who are sick. Comparisons, therefore, of mortality rates in the ideal manner, which would justly satisfy a statistician, are almost unobtainable.

One further point regarding mortality rates of premature babies is pertinent to our topic; namely, that qualitative differences in foods are not very likely to be reflected in mortality rates for infants during the first several days, possibly weeks, of life; so many factors are concerned that results cannot be interpreted in a clear-cut fashion. The early

TABLE I

DEATHS FROM PREMATURE BIRTH, BY AGE, U.S.A. 1944*

Infants that died from premature birth			
Age at Death	Number	Percent	Number per 1000 live births
Total	33,120	100.0	11.8
Under 1 day	18,909	57.1	6.7
1 day to under 1 week	9,750	29.4	3.5
1 week to under 1 month	3,406	10.3	1.2
1 month to under 1 year	1,055	3.2	0.4

* Based on data from U. S. Bureau of the Census. Data are for continental U. S.

causes of death are immaturity, intracranial hemorrhage, congenital defects, mechanical feeding difficulties leading to aspiration, and disturbances of water and electrolyte metabolism. Most infections can be controlled, excluding epidemic diarrhea which at least tentatively one may classify here. Food, too much and too soon, could lead to early digestive disturbances.

During the 10 year period, 1924-1933, there were 244 premature infants cared for in the New Haven Hospital. Their records were studied by Dunham and McAlenney[25] who reported a mortality of 27%. In the figures recently computed on our service by Dunphy and Koehler[26] for the subsequent 13 years (800 premature infants, 176 deaths), there has been no very striking change, the rate now being 22%. The figures furnished by Hess[13, 27, 14] for his Premature Infant Station in the Michael Reese Hospital for 25 years show an essentially similar mortality rate (27.5%). I use his results as a high standard of reference and because human milk is his basic diet for premature infants. The yearly fluctuations shown in Dunphy's mortality rates (a maximum of 36% and a minimum of 4%) are due to the yearly variations in the number of babies under 1000 gm. and, in the year of highest rate, to an epidemic of diarrhea probably of virus etiology. When numbers of infants per year are small, averages for three years might be expected to show more reliable trends.

The most frequent age at which death occurs in premature infants is under 24 hours. There has been no improvement in our clinic in any age groups in the later study period, 1934-1947, over corresponding figures for the earlier period, 1924-1933. Comparable

figures from Hess's clinic show more favorable results than ours in the survivals under 24 hours and less favorable results in the survivals over 48 hours*—variations probably explained by the factors already cited in the preceding discussion. In Table I are shown figures concerning the mortality rates of 33,120 premature infants with respect to age at death. These figures were prepared in the Children's Bureau[28] from data obtained in the Bureau of the Census for continental United States. Our figures and, I believe, those reported by Hess are not essentially different.

In a break-down of mortality rates according to weight groups we have also shown no improvement, and our results do not seem to differ from those of Hess as published.

Our survival rates for premature infants fed a half skimmed milk mixture are as favorable as those reported from other clinics. I would add that I know of no data indicating that in the past two decades (approximately) the survival rates for these infants in whatever category reported have significantly risen in clinics in which all facilities now thought to be valuable in care and feeding are available; and, further, that mortality rates do not suggest the superiority of human milk (pure or adulterated with cow's milk derivatives) over the described stock milk mixture. Our experience is thus in accord with the formulation by Dunham[28] for the United States that "under good conditions of care the prognosis for survival of premature infants in the three higher birth-weight groups may be assessed as follows:

2,001-2,500 gm.—Excellent. At least 93% should survive.
1,501-2,000 gm.—Good. At least 82% should survive.
1,000-1,500 gm.—Fair. At least 50% should survive."

It is fair to say that reports of the lowering of mortality rates for premature infants refer to reductions from higher figures to the levels herewith presented; below these no one seems to have gone.

Although statistically our mortality rates compare favorably with those from other sources, the comparison is rather a negative compliment. On the other hand, one gets positive support for the mixture described from the metabolic studies of Levine, Gordon and their associates.[3] Briefly, these workers have shown that in large numbers of premature infants, particularly those in the low weight group, "defective fat absorption was present, whether the mixture fed was human milk, cow's milk, or cow's milk in which olive oil had been substituted for butter fat." "Human milk, which is high in fat and low in calcium, phosphorus, and protein, hardly seems the food of choice for premature infants who have a defect in fat absorption and who are born with low stores of the three" food elements last named.

Furthermore, Gordon and McNamara[29] correlated daily fecal fat excretion and weight gains of premature infants fed equicaloric diets of varying fat content. The data show that when the diet is high in fat—35% of the total calories—the gain in weight is small. Thus one understands the reason for the false but oft-repeated assertion that for satisfactory weight gain the caloric requirement of the premature infant is high; namely, the calories are not utilized by the infant but are lost in the stools. Unless the explanation is appreciated, the usual but incorrect practice is followed of increasing the caloric in-

* Deaths in our series occurred while patients were in hospital; time of death in Hess's series not stated—may have been after discharge.

take when gain in weight is unsatisfactory. The correct practice would be to increase calories in protein and/or carbohydrate and reduce those in fat.

An important item in the appraisal of the nutritive value of a diet is rate of growth. Using New Haven Hospital records, the Children's Bureau staff made a study to determine whether there were differences in the rate of growth of infants fed human and those fed a one-half skimmed milk to which 10% dextrimaltose was added.

The rate of gain was studied for the third week of life, since it was decided that that was the earliest period at which gain in weight would be sufficiently stabilized to warrant conclusions on the effect of the type of feeding on weight.

Infants of one race (white) and of one sex (female) were selected for study in order

TABLE II
MEAN AVERAGE WEIGHT GAIN

Feeding	Birth Weight					
	Under 2,250 gm.		1,300–1,699 mg.		1,800–2,199 gm.	
	Mean Gain in gm.	Number of Infants	Mean Gain in gm.	Number of Infants	Mean Gain in gm.	Number of Infants
Human milk	7.0	8	—	0	8.4	7
One-half skimmed milk mixture	12.7	33	13.2	12	11.9	17

Weight gain of premature infants fed human milk or one-half skimmed milk: mean average weight gain per kilogram body weight per day during the third week of life, by birth-weight group. N. H. H.

to exclude any race and sex factors that might influence rate of gain. Single-born infants only were included for the same reason.

White female infants weighing at birth less than 2,250 gm. were selected because infants weighing 2,250 gm. or more are on the border line of maturity and the particular interest was in the more immature infants.

Only infants receiving less than 120 calories per kilogram of body weight per day are included in the material presented.

Though the original group of premature babies in the New Haven Hospital in the period under study, July 1, 1930—December 31, 1939, was large, rigid control to eliminate all factors which might influence gain in weight except the one factor of type of feeding, reduced the group to be considered to a small one, 41 infants. Column 1 of Table II shows the average weight gain per kilogram of body weight per day. Those on human milk gained an average of 7.0 gm., while those on one-half skimmed milk gained 12.7 gm. This would appear to show without doubt that infants on one-half skimmed milk gain faster than those on isocaloric human milk feedings, were it not for the fact that the one-half skimmed milk group is heavily weighted with the smaller premature babies which are known to grow more rapidly than the heavier babies.

An attempt was made to eliminate the factor of growth potential due to size by selecting two weight groups, one of small babies and one of larger babies, for comparison of growth on the different feedings. Table II shows that in the group of small infants,

1,300-1,699 gm., no infants were fed human milk so that no comparison could be made. In the heavier weight group, 1,800-2,199 gm., the infants on human milk gained only 8.4 gm./kg./day, while those on one-half skimmed milk gained 11.9 gm. These last two groups are comparable and this difference is statistically significant.

From this material the conclusion can be drawn that premature infants gain faster on half-skimmed milk than on human milk. This is in agreement with the results of a comparative study of similar but more extensive data by Gordon, Levine, and McNamara.[2]

Summary

No new concepts of infant nutrition have been presented, but an old one is emphasized. It is that infants' dietaries can be understood intelligently only when analyzed in terms of the unit of metabolism—the calorie. When babies do not thrive on a given food, it should not be changed blindly, but with careful consideration of the clinical conduct of the individual child, of the relative proportions in terms of calories of the essential food elements and of the concentration, i.e. the water content. Qualitative characteristics of food essentials are important but are not discussed in the paper.

It is also pointed out that infants, particularly those who are feeble, premature, convalescent, malnourished, can be fed very successfully on a cooked cow's milk mixture lower in fat and higher in protein and carbohydrate content than human milk. Calcium and phosphorus are present in ample amounts, but vitamins must be added to the diet. Liver, or liver extract, is recommended for administration to feeble, sick and premature infants based on the concept that unrecognized deficiencies may thereby be supplied.

The evidence is against the ideal food for these infants' being human milk—nature's food, certainly—but for the mature, healthy infant. No one can regard nourishing infants with adulterated or "reinforced" human milk as breast milk feeding.

Conclusion

Lest unwarranted implications be drawn from these remarks, may I say we have established under Dr. Edith B. Jackson's supervision a unit in the maternity ward providing facilities for the lying-in mother and her baby to share the same cubicle. One of the prime purposes of this project is the promotion of maternal nursing. Sponsorship of that development is just as strong as is my support of a special cow's milk mixture for premature infants. When the premature infant attains a degree of maturity commensurate with nursing at the breast, he should be given that privilege. Maternal lactation can be maintained in favorable cases with effort on the part of the mother and encouragement on the part of the physician.

Acknowledgements

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Addendum

The present medical routine for premature infants on the University Service, Grace-New Haven Community Hospital is as follows:

(1) All newborn infants weighing under 2000 gm. are cared for under isolation precautions; they are placed in beds which can be heated and in special rooms which are air-conditioned at a temperature of 25.6° C. (78° F.) and a relative humidity of 62%. (Type of bed still in use is that designed by Hess and available in 1928.) Exceptions may be made for infants weighing less than 1200 gm.; these may be placed in heated beds (Armstrong) which permit a continuous supply of oxygen as well as heat.

(2) Premature infants weighing under 1800 gm. are dressed in premature jackets.

(3) Premature infants are removed from heated beds after attaining weight of 2000 gm. and from air-conditioned rooms when weight of 2100 gm. is attained.

(4) Routine orders and procedures for premature infants admitted directly from delivery room are as follows:

a) On "danger list."
b) Nothing by mouth for first 24 hours of life.
c) Gentle suction to remove mucus from nose and throat p.r.n.
d) Inhalation of 95% oxygen and 5% carbon dioxide applied with face mask or cone for 1-3 minutes every hour for first 12 hours and p.r.n. thereafter.
e) Infants under 1200 gm. are given constant oxygen at the rate of 2.5L/min. which provides an O_2 concentration of approximately 60% in a small film cone; other infants are given constant oxygen as indicated. Constant oxygen is best accomplished with a bed such as the Armstrong unit.
f) Premature infants are not stimulated to cry.
g) Hot water bottles at 35.5° C. for temperatures below 35° C.; remove at once when temperatures reach 36° C.
h) Remove cover of Hess bed when temperature of baby is 37° C. or above.
i) All infants weighing less than 2200 gm. have special nurse for first 12 hours.
j) Premature infants receive parenteral vitamin K (5.0 mg.) on admission. If there is evidence of hemorrhagic disease, infant receives intravenously fresh plasma (preferably) or fresh blood.
k) Obstetric service notified in case of infant's death.

(5) Regime for second 24 hours of life.

Total fluids, 75 cc./kg.; total calories, 30/kg. (a) 40 cc./kg. is parenteral (usually clysis); (b) 35 cc./kg. of food containing 27 calories (approximately). (Parenteral fluid is one-half 5% glucose and one half Darrow's alkaline solution (Am. J. Dis. Child. 41:1347, 1931.) which contains sodium chloride, and sodium bicarbonate in the approximate proportions found in blood plasma. Hartmann's lactate Ringer's solution (J.A.M.A. 103:1349, 1934) is probably equally appropriate.)

(For clysis, skin is prepared with alcohol and needle wound is dusted with sulfathiazole powder.)

(6) Regime for third 24 hours of life:

Total fluids—110 cc./kg.; total calories, 55/kg.

a) 40 cc./kg. by clysis as above.
b) 70 cc./kg. of food containing 55 calories.

(7) Regime for fourth 24 hours of life.

Total fluids—117 cc./kg.; total calories, 75/kg.

a) 20 cc./kg. by clysis as above.
b) 97 cc./kg. of food containing 75 calories.

(8) Regime for fifth 24 hours.

Total fluids—117/kg.; total calories 90/kg.

a) No further clyses.
b) 117 cc./kg. of food containing 90 calories.

(9) Regime for sixth 24 hours.

Same as for fifth.

(10) Regime for seventh to eleventh 24 hours.

Total fluids—130 cc./kg.; total calories, 100/kg.

(11) Regime for eleventh to fourteenth 24 hours.

Total fluids—140 cc./kg.; total calories, 110/kg.

(12) Regime for fourteenth to eighteenth 24 hours.

Total fluids—150 cc./kg.; total calories, 120/kg.

(13) Regime for eighteenth 24 hours and thereafter.

Maintain fluids at about 150 cc./kg. and calories at 120 to 130/kg.

The feeding interval is usually three hours.

The stock milk mixture is made of 70 gm. of powdered whole milk; 50 gm. of powdered skimmed milk; 100 gm. of a sugar containing maltose and dextrines; and water to one liter. The caloric value is 88/100 cc. (approximate). If the infant takes oral feedings satisfactorily,

we have added (since 1944) 15 cc. of water to each 100 cc. of stock mixture, thus eliminating extra nursing attention necessitated for giving water between feedings. The caloric value of the more dilute mixture is 78/100 cc.

To each 100 cc. of food are added:

a) 2.0 cc. sodium citrate solution (6% by volume). This adds 10 mEq. of Na to each liter of food.
b) 1.0 mg. of thiamine.
c) 2.5 mg. of riboflavin.
d) 5.0 mg. of nicotinic acid.
e) 25.0 mg. of ascorbic acid.

Vitamins A and D are given in a water-miscible form in an amount which provides 5000 I.U. of A and 500 I.U. of D in the total milk mixture taken in 24 hours.

Beginning 12 hours after birth and continuing every five days thereafter, crude liver extract, 0.5 cc./kg., is given intramuscularly.

Kahn or Mazzini tests, urine analysis and blood counts are done before discharge.

Premature infants are discharged when weight is 2500 gm., unless contra-indicated for some special reason. They are not discharged until the medical social worker in cooperation with public health nurses and other groups concerned has been able to arrange adequate home care. This may require planning over a period of several weeks.

Spanish Abstract

Ningun concepto nuevo sobre alimentacion se presenta, pero en cambio se hace gran enfasis sobre los antiguos.

Un dietario para niños solo puede comprenderse inteligentemente cuando se analiza en terminos de unidad de metabolismo: "la caloria."

Cuando los niños no progresan con el alimento dado, no deben hacerse cambios e ciegas, sino despues de cuidadosas consideraciones clinicas en relacion con el propio individuo, particularmente en relacion con las calorias de los alimentos, esenciales y su concentracion determinada por su contenido en agua. Las caracteristicas cualitativas de los alimentos esenciales son muy importantes pero no se discuten en este trabajo.

El autor presenta el desarrollo de un tipo de alimento a base de una simple mezcla de leche de vaca para la alimentacion de niños debiles, malnutridos, convalecientes y prematuros.

La experiencia clinica demuestra que este tipo de dieta es por lo menos tan satisfactorio como la leche humana y en efecto hay estudios clinicos y de laboratorio que demuestran que la leche humana no es el alimento ideal para los prematuros.

Los prematuros progresan mejor con una mezcla de leche de vaca hervida conteniendo mas proteinas y menos grasa que la leche humana y con un contenido liberal en carbohidrato, calcio, fosforo y vitaminas. El extracto hepatico es recomendado a los debiles, prematuros y niños enfermos, fundandose en el concepto de que él puede cubrir deficiencias que pueden pasar inadvertidas.

Muchos prematuros que eran alimentados con leche de mujer, se alimentan hoy con mezclas de leche humana reforzada con leche de vaca descremada.

Las investigaciones y observaciones clinicas hechas en el Hospital de New Haven han sido ampliamente respaldadas por estudios de laboratorios hechos en el Departamento de Pediatria de la Escuela da Medicina de Cornell.

789 Howard Avenue

THE TREATMENT OF FIBROSIS OF THE PANCREAS IN INFANTS AND CHILDREN

By CHARLES D. MAY, M.D., AND CHARLES UPTON LOWE, M.D.
Boston, Mass.

NEARLY ten years have elapsed since the clinical entity fibrosis of the pancreas was defined clearly by Harper, Andersen, Blackfan and May.[1, 2, 3] Since our first report from the Infants' and Children's Hospital in Boston[3] 110 patients with this disease have been treated. We have reviewed this entire group of 110 with particular attention to 40 living patients in order to determine what form of therapy has been most helpful.

In evaluating the efficacy of therapy in any disease, it is of paramount importance to observe the natural history of the disease when no treatment is given. The first 38 children with this syndrome reported from this hospital in 1938 were all dead by the age of two years. The lesion in the pancreas in the patients described in this early report

TABLE I

INFANTS—FIBROSIS OF THE PANCREAS—ORDINARY DIETS—NO PANCREATIN
(Data Recorded on a Daily Basis)

Patient Period No.	Calories per kg. body weight	Nitrogen Intake gm./kg.	Nitrogen Retained gm./kg.	Per cent Fat Retained	Per cent Nitrogen Absorbed
Normal Infants*	100	0.70	0.17	95	89
R. D'A.* II- 1	100	0.51	0.22	—	78
G. L.* II- 3	90	0.61	0.10	41	59
R. McG.* II—4	80	0.59	0.12	—	75
J. S.* II—5	165	1.18	0.24	—	60
B. H.* II—6	130	0.91	0.14	—	76
M. C.** II—7	64†	0.48	0.11	37	—
F. B.*** II—13	155	0.90	0.16	36	42

† Calories from whole milk. Additional number of calories given in soft baby diet in an unknown amount.

* Shohl et al.[6]

** Shohl.[11]

*** May, and Lowe.[12]

From the Department of Pediatrics, Harvard Medical School, and the Infants' and Children's Hospitals, Boston, Mass. Aided by a grant from Mead Johnson and Company.

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was discovered at autopsy so the conclusion might have been reached that the natural history of the disease included death before the age of two years. Due in large part to development of technic for analysis of tryptic activity in the duodenum and more adequate interpretation of the clinical and roentgenographic signs in the lungs, the diagnosis of fibrosis of the pancreas has been made with greater ease in the ensuing years. It became apparent that, aided by an increased awareness of the significance of symptoms of early or mild involvement of the pancreas and lungs, one could find children with this disease who, without the aid of therapy, remained alive and surprisingly well up to 6 and 8 years of age. It was with particular emphasis on this aspect of the disease, the ability of the children to survive and even thrive without therapy, and constant reference to the scope of the natural history of this syndrome that we undertook the following review.

TABLE II

CHILDREN—FIBROSIS OF THE PANCREAS—ORDINARY DIETS—NO PANCREATIN
(Data Recorded on a Daily Basis)

Patient Period No.	Calories per kg. body weight	Nitrogen Intake gm./kg.	Nitrogen Retained gm./kg.	Per cent Fat Retained	Per cent Nitrogen Absorbed
Normal Children*	85	0.52	0.04	95	90
M. H.* I—9	60	0.41	0.10	64	77
M. H.* I—6	70	0.49	0.10	28	69
B. H.** I—7	112	0.53	0.13	—	65
P. R.*** I—11	88	0.91	0.178	37	61
J. S.*** I—14	93	0.99	0.073	40	56

* Shohl et al.[8]
** Shohl.[11]
*** May and Lowe.[12]

It should be remembered that in the disease, fibrosis of the pancreas, two components are present regularly in each patient: (1) an impaired absorption of food and (2) a pulmonary lesion. The origin of the intestinal malabsorption is obvious; it stems from the lack of pancreatic enzymes. The origin of the pulmonary lesions is less clear. Whether these result from a basic pathologic process in the lungs unique to this disease or from a type of pulmonary infection peculiar to children with this syndrome or from a combination of both remains to be established. It appears, however, that all children with fibrosis of the pancreas eventually give clinical and pathologic evidence of pulmonary involvement which, once begun, is persistent though variable.

It has been known for a long time that the pancreas secretes digestive enzymes more or less fundamental to the digestion and absorption of food. Pratt, Lamson, and Marks as early as 1909[4] demonstrated that survival of dogs was possible when pancreatic enzymes

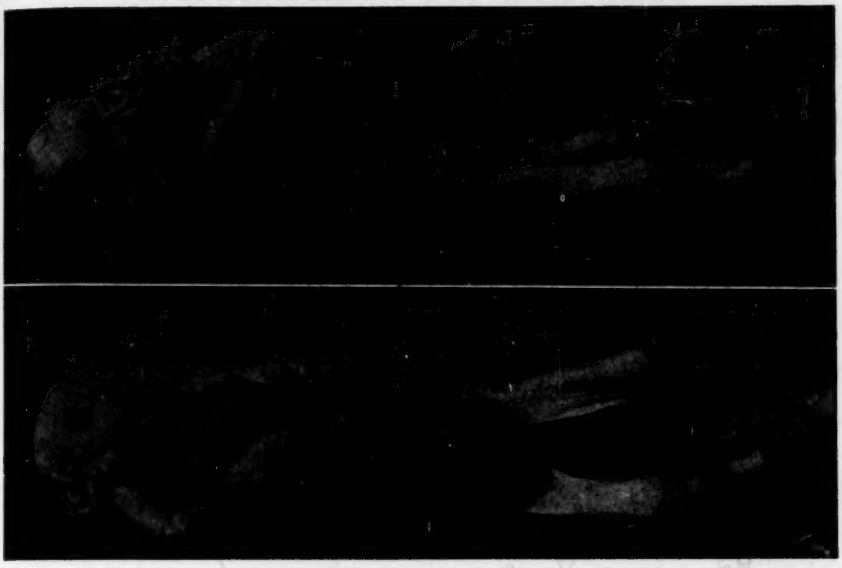


FIG. 1A. Patient No. 314151, appearance and roentgenograms (below left) of lungs at age of 5 months, before therapy indicated in Fig. 2.

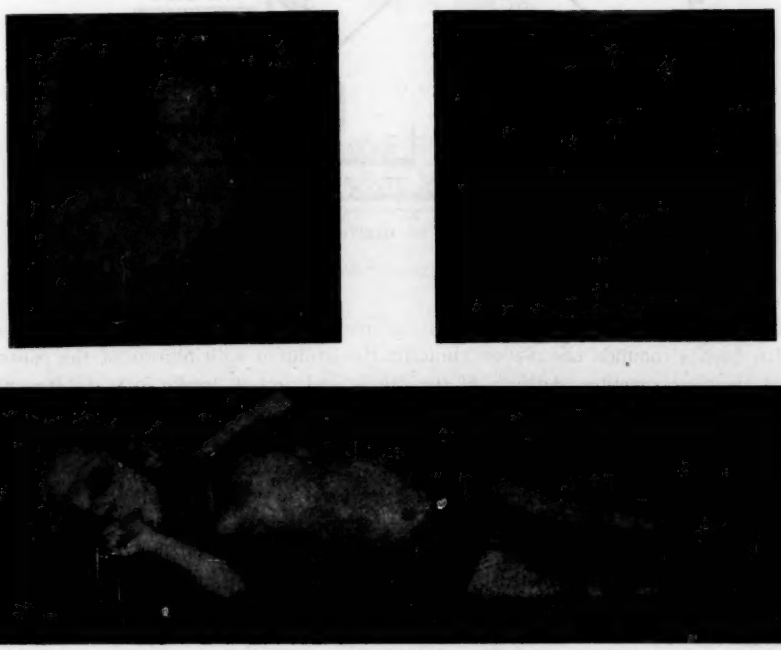


FIG. 1B. Patient No. 314151, appearance and roentgenograms of lungs (above right) at age of 6 months after 1 month of therapy as indicated in Fig. 2.

were excluded from the intestine by ligation of the pancreatic duct. Since then balance studies performed on such animals by Handelsman, Golden and Pratt[5] have given data which explain in part their ability to survive. It has been learned that although their digestion is extensively inefficient, they tend to compensate for this by a ravenous appetite leading to an increased intake of food.

There are similiarities between children with this disease and dogs whose pancreatic ducts have been ligated. Shohl, May, and Schwachman[6] undertook nitrogen and fat balance studies in children with fibrosis of the pancreas. Tables I and II present data made up in part of cases from their original report. The children were consuming a normal diet during the periods tabulated. It is apparent that they were capable of main-

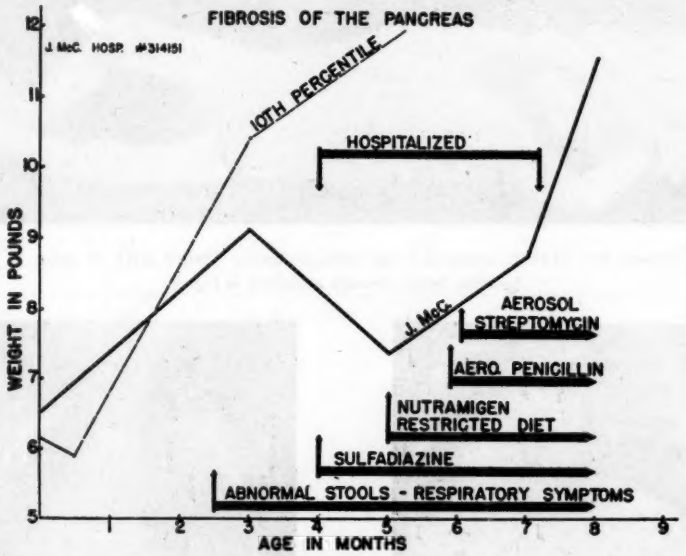
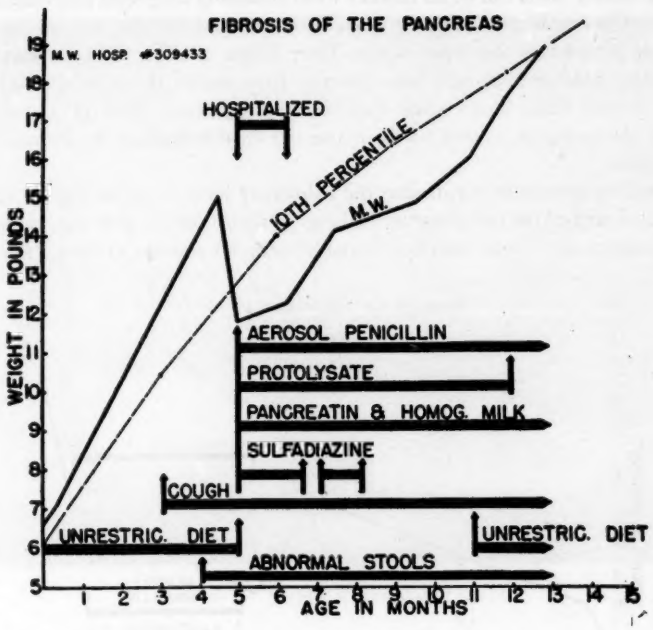


FIG. 2. Clinical course and therapy of patient No. 314151 shown in Fig. 1A and 1B.

taining a positive nitrogen balance in spite of marked impairment of nitrogen absorption. It has been a common observation clinically that children with fibrosis of the pancreas have ravenous appetites. Analysis of the caloric and protein intake in 9 children with fibrosis of the pancreas who were allowed a normal well-balanced diet taken ad lib revealed that fortunately these children tend to compensate (by increased intake) for the low efficiency of intestinal absorption. The average intake of these children was 140% of the number of calories suggested by the National Research Council[7] for children of similiar age and 155% of the recommended protein intake. All these children at the time the analysis was performed were in a good nutritional state. It is thus possible to see two similiarities between these children and experimental animals: (1) a markedly increased appetite which causes a high intake of food, and (2) ability to achieve a positive nitrogen balance in the face of extreme intestinal inefficiency.

Criticism may be leveled against balance periods, particularly short term ones, as a means of evaluating diets. Although there may be numerous possible experimental errors



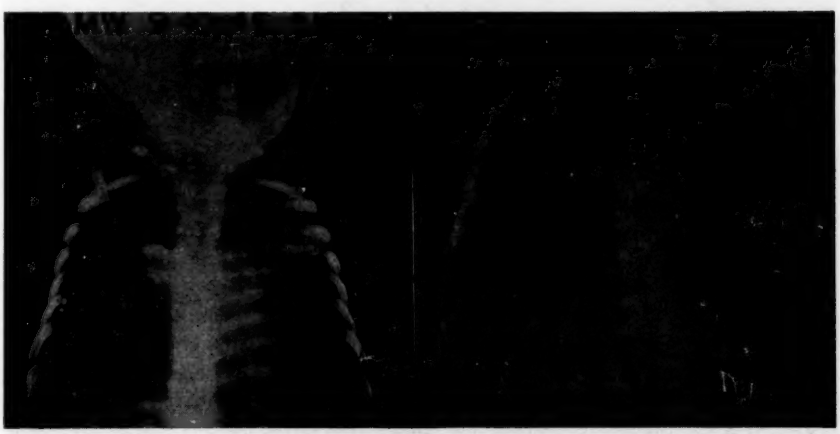


FIG. 3. Clinical course and roentgenograms of lungs of patient No. 309433 before and after therapy as indicated.

in balance studies, there can be no mistake when following long term longitudinal growth. Certain conclusions become obvious if children are followed for five or six years and during that period have increased in size. Their caloric intake must have been sufficient; their nitrogen balance must have been positive. Examples of this type of observation are described below. Thus, it is evident that defective digestion, although a component of fibrosis of the pancreas, cannot be the major one in determining the eventual outcome of the patient.

The other component of the disease, the pulmonary lesion, is more difficult to evaluate. Farber[8] has described the pathology of the lungs in fibrosis of the pancreas. He has pointed out the existence of a viscid secretion in the bronchioles and has described the character-

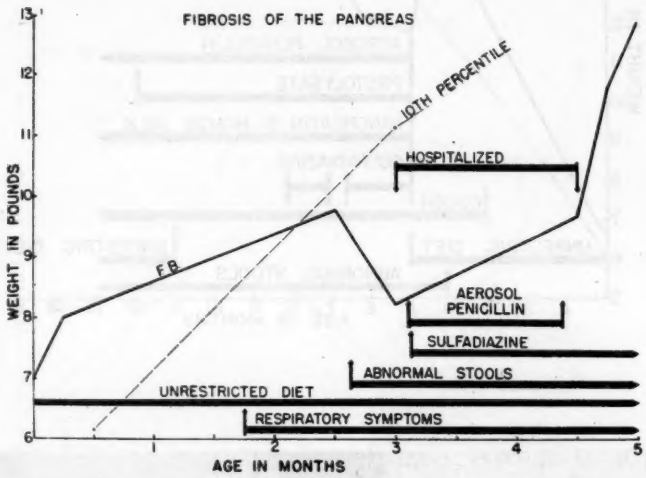
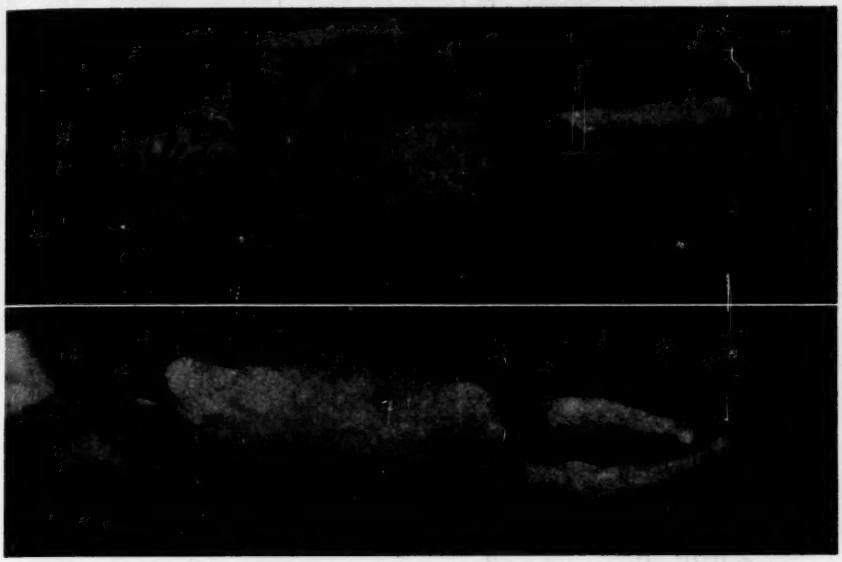


FIG. 4. Clinical course and therapy of patient No. 314399 whose appearance is shown in Fig. 5. Patient No. 314399 at 3 months of age.

istics of the infection in the lungs. Clinically, these patients are regularly infected with the Staphylococcus aureus and occasionally with other organisms; both thick mucoid and mucopurulent secretions have been observed to be produced in their lungs. It has been demonstrated by Grossman et al.[9] that a negative nitrogen balance occurs at least in acute infections. We do not have balance studies in children with fibrosis of the pancreas in which we can specifically say that infection was responsible for a negative balance period. It would seem, however, on the basis of both the experimental work to which reference has been made and the clinical description of patients to follow below that infection in an important element in the pulmonary component of the disease and in the eventual outcome. Examination of longitudinal growth when plotted in chart form as in Figures 1, 2, 3, 4, 5, and the roentgenograms and photographs of the patients charted give some evidence for the statement that infection in the lungs may precipitate nutritional difficulties. It is apparent that these children suffered serious weight loss in a period which followed closely the onset of severe respiratory symptoms. The clinical course as well as much of the respiratory process was greatly improved following the use of antibiotic drugs directed against infection.



Patient No. 314399 at 4 months of age.

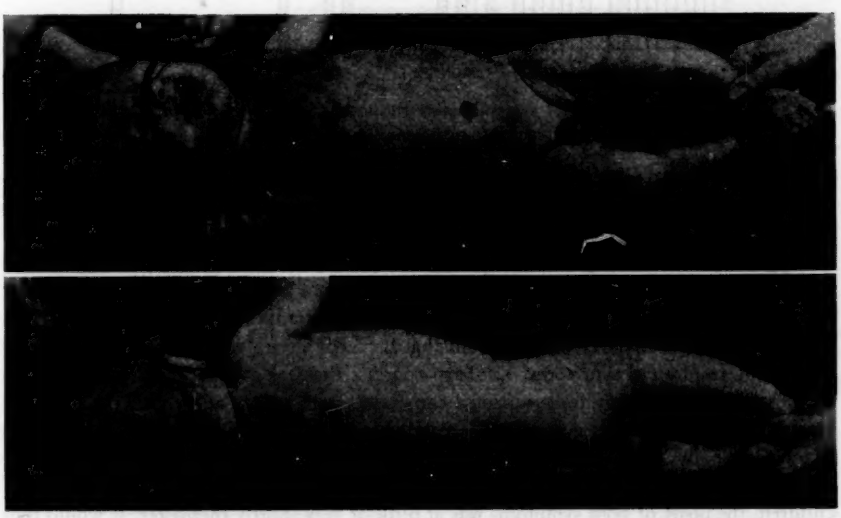


FIG. 5. Appearance of patient No. 314399 before therapy (above) and after therapy (below) as indicated in Fig. 4.

The living children included in the present review have had the diagnosis of fibrosis of the pancreas confirmed by finding in all cases that the normal tryptic activity of duodenal juice was absent. Corroborating evidence has included a careful review of the patient's entire medical history, vitamin A absorption tests, roentgenograms of the lungs, and frequently metabolic balance periods.

If the 40 living children with fibrosis of the pancreas are depicted graphically (Figure 6), plotting the period of time that elapsed before any therapy was instituted, several features become apparent. There is a large group of children, approximately half, who required treatment before one year of age. The remainder of the group did not require therapy until later in childhood. We have divided arbitrarily these two groups at 11 months where there seems to be a natural division. The children who required therapy

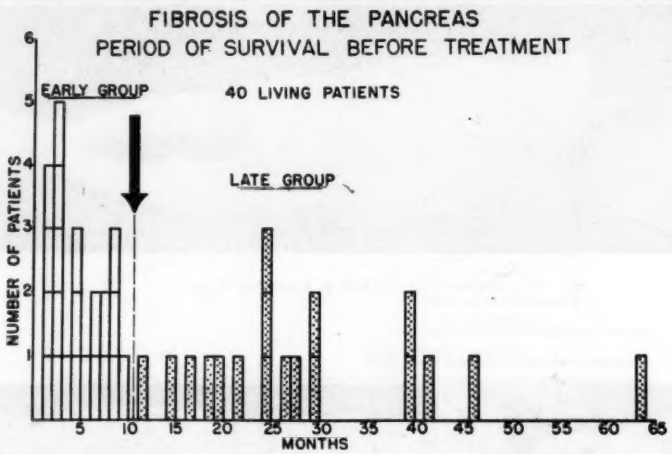


FIG. 6. Period of survival before treatment showing division into groups requiring treatment "early" or "late."

before one year have been designated the "early group," and those who did not need treatment until later have been designated the "late group." This chart gives substantial clinical basis for the statement that chilren can survive for long periods of time without therapy and with ordinary diets.

One might question, then, whether there is a difference between these two groups other than their period of survival before therapy. Figure 7 arranges these patients in terms of their presenting complaint. It is apparent that the early group was hospitalized primarily because of respiratory symptoms. In sharp contrast the late group presented themselves for hospitalization mainly for nutritional complaints such as loss of weight and abnormal stools. Does that mean that the fundamental disease was different in these two groups of children? By careful questioning an attempt was made to date the onset of the nutritional and respiratory symptoms. Figure 8 demonstrates that in both groups of children, the onset of both symptoms was at birth or very shortly thereafter. It would thus seem that the magnitude of the pulmonary involvement was the sole point of difference. Figures 9 and 10 show the roentgenograms of the lungs of two children in the late group. It is apparent that although the roentgenograms were not normal, pulmonary infiltration and emphysema were minimal. In comparison, roentgenograms of the lungs (Figures

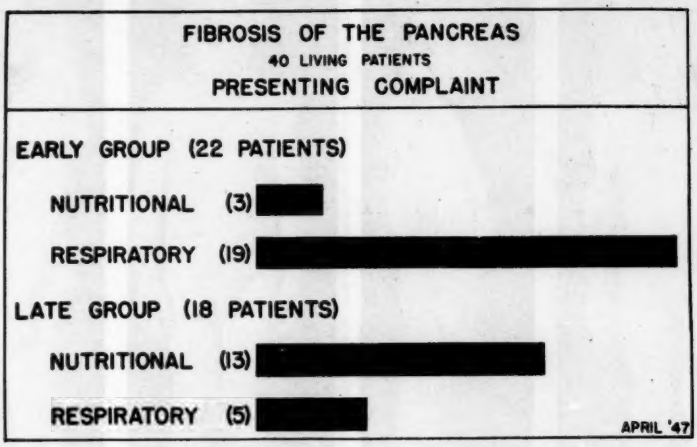


FIG. 7. Presenting complaints of "early" and "late" groups so designated in Fig. 6.

2 and 3) of children in the early group at the time of initial hospitalization showed severe pulmonary infiltration and emphysema.

One must be cautious when attempting to evaluate dietary therapy in these patients. Figures 1, 2, and 3 depict the course of two children in the early group. The precipitous

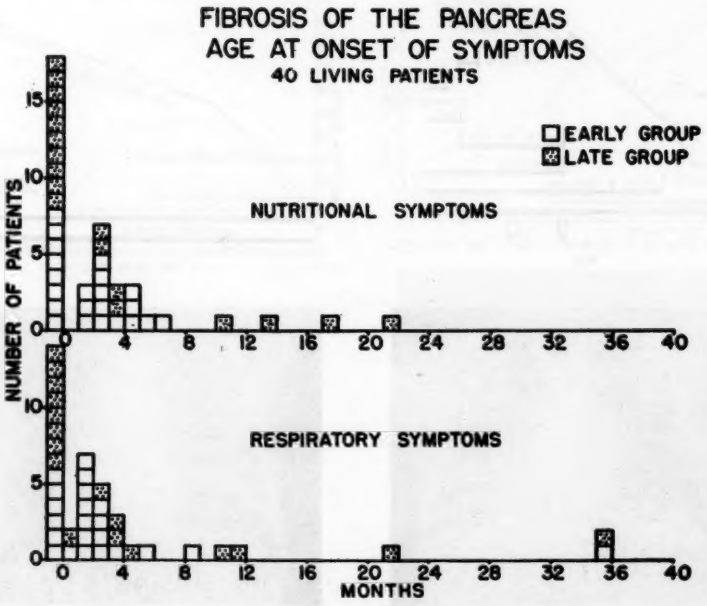
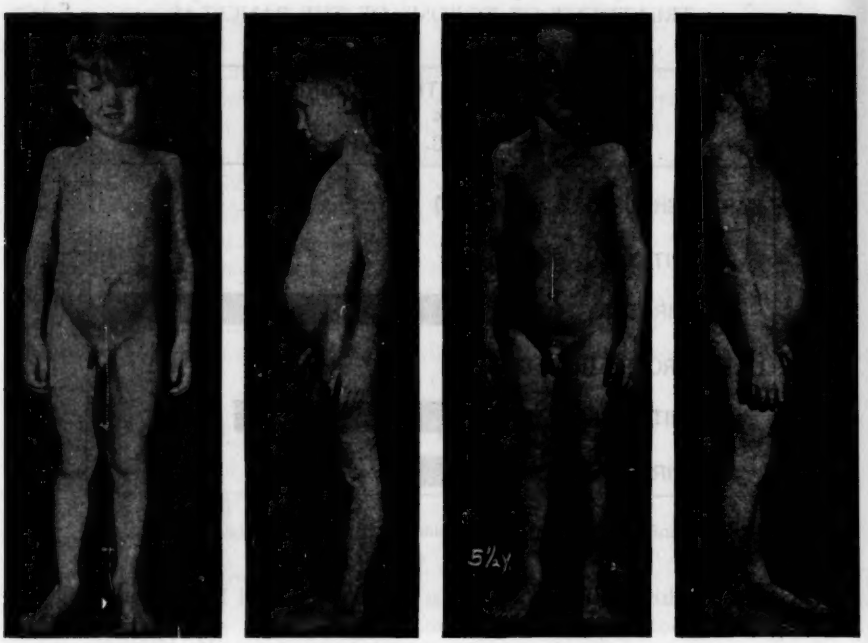
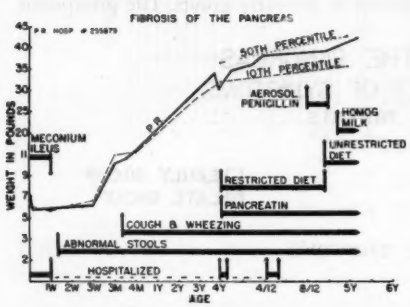


FIG. 8. Age at onset of respiratory symptoms and symptoms of nutritional disturbance in the "early" and "late" groups, so designated in Fig. 6.





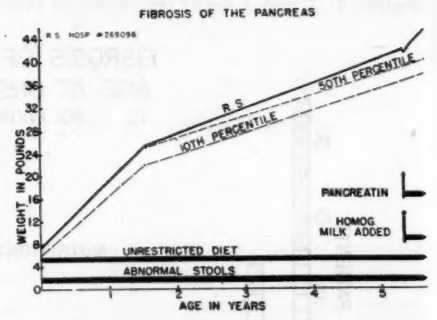


FIG. 9. Patient No. 255879: Appearance and roentgenogram of lungs at 4½ years of age with chart of clinical course and therapy.

FIG. 10. Patient No. 269096: Appearance and roentgenograms of lungs at 5½ years of age and chart of clinical course and therapy.

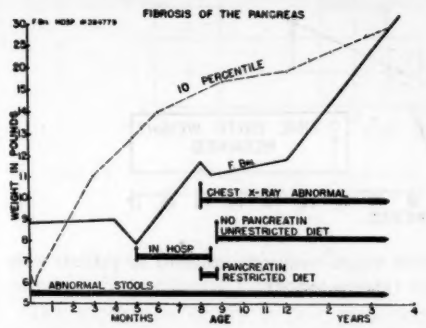
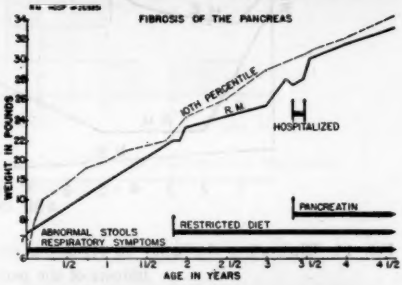


FIG. 11. Patient No. 284779: Appearance at 3½ years of age and roentgenograms of lungs at 9 months and chart of clinical course and therapy.



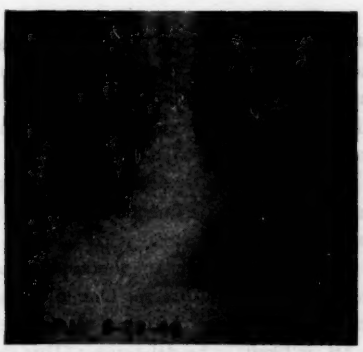


FIG. 12. Patient No. 269851: Appearance and roentgenograms of lungs at 3½ years of age and chart of clinical course and therapy.

weight loss at the onset of respiratory symptoms may be seen. The diet is indicated on the charts. Both these children had specialized, restricted diets as well as specific therapy directed toward the pulmonary infection. Inspection of the charts reveals that return in weight occurred when both dietary and antibiotic therapy were instituted. In Figure 3, however, this improvement continued even when a completely normal diet was supplied. More convincing, however, is the course of the patient illustrated in Figures 4 and 5. This patient received only therapy directed at his pulmonary infection and an unrestricted diet was fed before, during, and after hospitalization. It is apparent that the weight gain was associated only with therapy for his pulmonary infection. Charts of two patients are shown who had minimal pulmonary disease and an unrestricted diet in Figures 10 and 11. One salient feature has been most characteristic of their dietary history: a complete well-

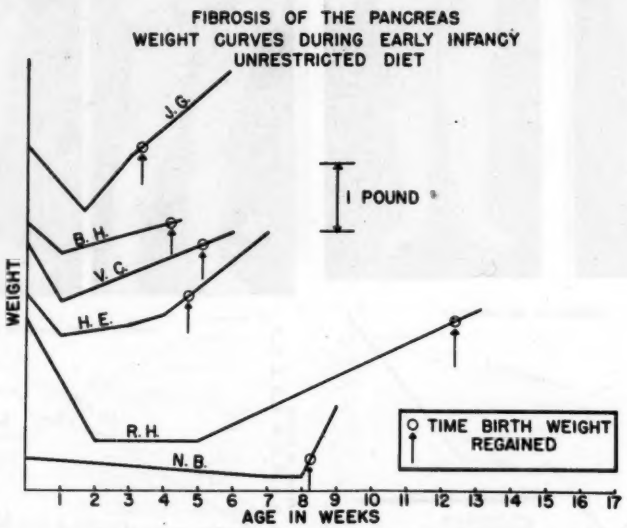


FIG. 13. Illustrating the delay in regaining the birth weight frequently exhibited by patients with fibrosis of the pancreas (plateau period).

balanced diet given *ad lib.* Figure 12 shows the course of a child with moderate pulmonary involvement on restricted and unrestricted diets. Inspection reveals that without therapy directed at the pulmonary lesion dietary therapy had little effect upon the general clinical course and weight gain. The photographs and roentgenograms of these patients are presented.

Thus, on the basis of metabolic balance data substantiated by clinical evaluation and the findings in experimental animals reported in the literature, it is possible to make the following statements:

First, restrictive dietary therapy per se has little influence upon the general course of patients with this disease. One may state also that a poor dietary intake would have serious implications. In other words, the subtraction of any component of the diet, such as fat, is likely to be deleterious. This statement is not to be construed as meaning that a normal diet abundantly consumed and wasted by poor absorption with passage of grossly

abnormal stools is ideal. The reasonable approach to improvement would be a really adequate pancreatic enzyme substitution therapy leading to efficient utilization of an ordinary food intake and normal stools.

The second conclusion might be that adequate therapy for the pulmonary disease is of paramount importance. Figure 1 illustrates the pulmonary involvement in a child before and after treatment. The same type of comparison is made in Figure 3. It is thus possible by adequate antibiotic therapy to improve the pulmonary process. Penicillin and/or streptomycin have been given by aerosolization and such therapy has been continued for from six weeks to one year according to the clinical response. While the infectious element in the pulmonary process may be alleviated to some extent by such treatment, it is important to emphasize that a basic pathologic abnormality persists and follows its own

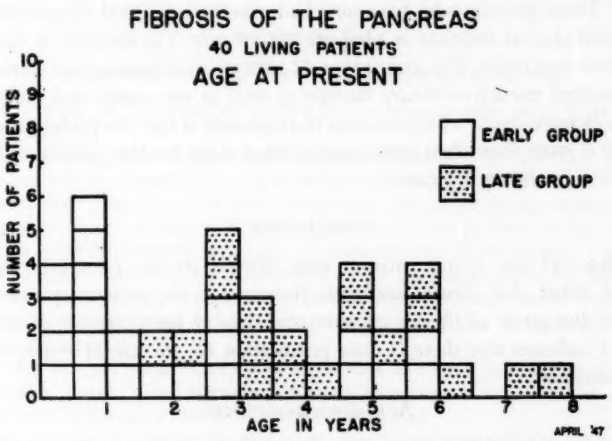


FIG. 14. Ages of living patients related to the "early" or "late" development of symptoms requiring treatment as designated in Fig. 6.

natural history. We believe that the element of infection was the major factor in influencing the nutritional state.

The application of the technic of aerosol inhalation of antibiotics to patients with fibrosis of the pancreas has been reported by DiSant'Agnese and Andersen.[10] This therapy was combined with dietary restrictions and enzyme substitution. The conclusion that dietary therapy is essential for success with aerosol therapy seems unsubstantiated to us.

There is an important exception to the concept of good weight gain when a complete diet is given ad lib. Figure 13 shows weight gain early in life of children with fibrosis of the pancreas. It appears that these patients regained their birth weight much more slowly than do normal children, and this slow return to birth weight has not been caused by ordinary neonatal disease. It is possible that in this period, which we have termed the "plateau period," special food may be required. We have not been able to test this impression by balance studies.

An over-all evaluation of our 40 living patients would seem to give considerable support to our conclusions. A tabular summary of the age at present of these children has been made in Figure 14. As before, these children have been divided into the early and late

groups, and one can see that almost half of those who fell into the early group have survived at least one year. Five of them have survived almost four years. It is thus apparent that while three quarters of our patients are now in the late age group, this large number is not composed only of those who survived long periods of time before their illness was severe enough to bring them to the attention of a physician.

Admittedly the test of any therapeutic regimen in these patients is the prolongation of life. This requires long term follow-up for ultimate appraisal. It has been demonstrated in some of the individual patients presented that survival on an unrestricted dietary regimen in the absence of pulmonary infection may be extraordinarily long and reasonable health may be enjoyed. Not all children who have received a well-balanced, ad lib diet and intensive chemotherapy have flourished equally well. Twenty-nine of the 40 patients have had aerosol therapy. Eleven have not needed it. Twenty-eight of the 40 are now on a normal diet. Three patients who have now had a normal diet and chemotherapy are not showing a good clinical response or adequate weight gain. The majority of the 40 patients are receiving no pancreatin. The great group of patients who make up the numbers of those who died received restrictive dietary therapy as well as pancreatin and ordinary chemotherapy. The essential point which we wish to emphasize is that the prolongation of life in these patients is more dependent upon satisfactory therapy for the pulmonary process than upon any particular dietary regimen.

Conclusion

This analysis of the living patients with fibrosis of the pancreas provides some basis for the belief that aerosol antibiotic therapy for the pulmonary infection and a well-balanced diet given ad lib can improve considerably the prognosis of fibrosis of the pancreas, and indicates that there is little justification for the use of restricted or special diets in this disorder.

Acknowledgements

Mr. F. R. Harding, F.B.P.A., has contributed his ideas and time in preparing the photographs and charts included in this paper. We are indebted to him for his help.

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SPANISH ABSTRACT

Tratamiento de pacientes con fibrosis del pancreas

Este es un reporter de 110 casos de fibrosis del pancreas tratados en el Infant's Children's Hospital de Boston.

Recientemente nosotros hemos revisado estos pacientes con el objeto de determinar que terapeutica ha sido mas beneficiosa, muy especialmente en 40 pacientes que han sobrevivido.

Es importante tener presente que en este sindrome hay dos grandes componentes que requireren atencion terapeutica: 1) la deficiencia nutricional relacionada con la falta de los fermentos pancreaticos y 2) las lesiones pulmonares integradas por lesiones basicas de estos organos y por infecciones sobreañadidas. Nuestra experiencia nos permite afirmar que muchos pacientes con lesiones minimas pulmanares, llegan hasta nosotros con dos o mas años de edad con bastante buena conservacion de su estado nutritivo, aun en los casos de no haber estado alimentado con dietas especiales ni bajo la administracion de pancreatina.

En la busqueda de una dieta ideal, una serie de periodos de balance fueron ensayados en pacientes de distintas edades, usando dietas ordinarias, bajas en grasas, con o sin la adicion de pancreatina y tambien utilizando alimentos a base de hidrolisados de caseina.

La absorcion de grasa y proteina fue medica en estos sujetos y se encontro que habia una gran reduccion en la eficiencia de la absorcion de grasa y proteina, encontrandose solo el 60% o 70% de la proteina y el 40% o 60% de la grasa absorvida, en contraste con la casi totalidad de absorcion que ocurre en los sujetos normales. Esto determino una elevacion del nitrogeno contenido en la sangre. No habia relacion entre le cantidad de grasa excretada en las heces y el nitrogeno contenido en la sangre o nitrogeno absorvido no habiendo en realidad una base que apoyara la exclusion de la grasa en la dieta.

En todos los pacientes el comienzo de la enfermedad aparecia desde el nacimiento o poco tiempo despues. En aquellos pacientes en que los sintomas pulmonares eran minimos o muy tardios en su aparicion el estado nutricional se mantuvo bastante bueno, por el contrario aquellos pacientes en los que las lesiones pulmonares fueron marcadas y observadas prontamente se presentaron graves trastornos nutritivos.

El caso clinico de los pacientes esta en relacion con la intensidad y grado de la lesion pulmonar.

Las fluctuaciones del peso tambien guardan relacion con las lesiones pulmonares, sin grandes cambios por una u otra dieta. La ganancia en peso se ha visto indiferentemente con una u otra dieta y con o sin el uso de la pancreatina. Una excepcion a esta regla la constituyen los niños durante los tres primeros meses de la vida en los que ninguna o poca ganancia en peso se observa con la dieta libre, sino perciben en el alimento hidrosales de caseina.

Puede afirmarse que el manejo satisfactorio de estos enfermos no consiste en la sustitucion de fraccion alguna de la dieta, los disturbios son debidos a debectos en la absorcion frente al aumento de alimento, no obstante se recomienda el uso de enzima pancreatica. Hay que destacar que la mayor atencion debe ser dirigida al tratamiento del proceso pulmonar con la ayuda de los antibioticos.

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TICK PARALYSIS

Three Cases of Tick (Dermacentor variabilis Say) Paralysis in Virginia: With a Summary of All the Cases Reported in the Eastern United States

By CAROLYN MOORE MCCUE, M.D., J. B. STONE, M.D., AND LEE E. SUTTON, JR., M.D.
Richmond, Virginia

TICK paralysis is a disease which is dramatic in its onset and course. Its symptomatology is similiar to poliomyelitis in the initial stages, but it is so easily cured if recognized that it is now a subject of great interest. Three cases from Virginia are reported here: two were referred recently to this Pediatric Department which is serving as a poliomyelitis center; the third was seen in March of 1945. The first and most severe one required the use of the respirator for 48 hours. In a review of the literature there are only a few other cases of respiratory paralysis in the United States. Death was the outcome in the earlier reports by Townsend[1] and McCornack.[2] The respirator was used by Amesse and Lyday[3] and in our first case with marked temporary benefit.

HISTORY

Tick paralysis has been recognized since 1824 when it was first described in Australia. The history of the disease has been well summarized by Abbott[4] and Stanbury.[5] The earlier reports are from Australia, South Africa and Europe. It was first recognized in sheep and cattle in Australia. The earliest human cases were two infants, who died in British Columbia in 1898 with engorged wood ticks on their necks. In 1940 Hamilton[6] reviewed cases in Australia recording eight deaths. The respirator was used in two of the seven other cases he reported; one of the two died. All of his cases were thought to be due to Ixodes holocyclus, which is the common tick in Australia.

There have been many occurrences of tick paralysis reported in Oregon, Washington, Idaho, and Montana. McCornack[2] in a pioneer paper in 1921 cites ten cases of his own from that region, and several additional cases of neighboring physicians. In this group two patients died with bulbar signs and respiratory paralysis. He quotes Temple[7] and Todd[8] who reported cases as early as 1912. These and many other cases from the Rocky Mountain States were carefully summarized by Abbott[4] in 1943. The reports of recent cases from the states east of the Mississippi River where ticks are not so prevalent justify a brief summary of those cases in this region.

TRANSMISSION

In the United States there are two tick species which are known to cause tick paralysis.[9] The Dermacentor andersoni Stiles is found in the Rocky Mountain States of this country and Canada. This tick may also cause Rocky Mountain spotted fever, Colorado tick fever, American Q fever and tularemia. The common American dog tick, Dermacentor variabilis Say, has been known to cause paralysis in dogs and has been reported to cause

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paralysis in human beings in Georgia,[10, 11, 12] South Carolina,[13, 14] and North Carolina,[1] Long Island,[15] Kentucky,[16] and now in Virginia.

Distribution

Table I illustrates all the cases reported previously in the eastern United States, and three recent ones in the south and west. DeSanctis is th only one who has reported a case as far north as New York on the east coast. Townsend's patient in North Carolina was the only one in this group who died. This child had a severe ascending paralysis and died of respiratory failure. The three cases from South Carolina and Georgia all recovered and none showed respiratory paralysis, although Ryans'[17] case had some residual weakness of the hands. More recently Prince[16] and others from Kentucky reported two cases in which one required the respirator, but did not synchronize well and so was removed. There are other cases reported from Texas,[18] Idaho,[19] and Colorado.[3] The only one of these requiring the respirator was Amesse's four-year-old child from Denver, who recovered after being in the respirator for 18 hours.

Diagnosis

Our three cases are similar in most respects to the usual picture of tick paralysis. A child has been in areas where ticks are found. He becomes irritable for one to two days and then ataxia develops. Weakness in the legs progresses rapidly to the back and arms in the next 48 hours. There may be weakness or a complete flaccid paralysis which rapidly ascends to include the neck and involvement of the cranial nerves. A positive Romberg's sign is almost always present, associated with hypoactive to absent reflexes. If the tick is found and removed the process is rapidly reversed. If not, symptoms of involvement of the medulla occur with ocular palsies, speech or swallowing difficulties and finally respiratory paralysis. If these symptoms have not progressed to an extreme degree or if the respirator is used, as was necessary in our first case, the patient may still recover.

The four noteworthy points which differentiate this condition from poliomyelitis are:

(1) Absence of fever, unless there is a secondary infection.
(2) Absence of pain, although other sensory changes may be noted.
(3) Negative spinal fluid.
(4) The presence of a tick bite upon the patient.

Mechanism

The theories as to the mechanism of the ascending paralysis still are not proven. The best and most acceptable one is that neurotropic toxin is elaborated in the saliva of the pregnant female tick.[5,20] The effect of this on the anterior horn cells of the spinal cord or on the peripheral nerves is to produce a progressive flaccid paralysis, which ultimately leads to death by respiratory paralysis if the tick is not removed. Most reports in the United States reveal complete clearing of the paralysis or weakness in about 48 hours after removal of the tick. Some cases from Australia report a longer period for recovery.

Treatment

The treatment is obvious once the diagnosis is made. Removal of the tick results in a cure unless supportive therapy, including the use of the respirator when needed is given. In each case, the tick was found in the scalp where it might have gone unnoticed had careful search not been made.

TABLE I

ALL CASES PREVIOUSLY REPORTED IN THE EASTERN UNITED STATES WITH THREE RECENT ONES IN THE SOUTH AND WEST

Physician Reporting	Location	Age in Years	Name of Tick	Paralysis or Weakness	Respiratory Paralysis	Estimated Before Removal	Duration of Paralysis After Removal
DeSanctis, A. G. & Di Sant' Agnese, P. A.	N. Y. 1 case	3	D. variabilis Say	Legs weak, Ataxia.	No	12 days	48 hrs. Well
Townsend, R. G. & Nash, J. F.	N. C. 1 case	4	Unknown	Flaccid paralysis all extremities. Advanced to cranial nerves severely.	Yes No respirator used	2 days	2 hrs. Died
Gibbes, J. H.	S. C. 1 case	Adult	Unknown	Leg and arms weak, sensory changes in legs, speech thick.	No	4 days	2 days. Well
Ryan, C. P. & Canning, H. B.	S. C. 1 case	8	D. andersoni Stiles	Paralysis arms, hands, back and neck and legs. Sensory changes, some pain.	No	1 day	1 week. Weak grip remained
Beach, M. W. & Ravanell, B. O.	S. C. 1 case	4	D. variabilis Say	Ataxia.	No	2 days	12 days. Recovered
Mulherin, P. A.	Ga. 1 case	7	D. variabilis Say	Ataxia, sensory changes.	No	1 day	8 days. Well
Robinow, F. C. & Carrol, T. B.	Ga. 1 case	9	D. variabilis Say	Paralysis legs, weakness arms, speech thick, nystagmus.	No	7 days	3 days. Well
Harper, A.	Ga. 1 case	4	Unknown	Legs paralyzed.	No	2 days	1 day. Well
Prince, G. E. & Keeley, J. C. & Scott, E. P.	Ky. 2 cases	4	D. variabilis Say	Legs and arms paralyzed, nystagmus.	Yes respirator used*	8 days	3 days. Well
Prince, G. E. & Keeley, J. C. & Scott, E. P.		6 months	Unknown	Arms and legs paralyzed.	No	1 day?	2½ days. Well
Bloxsom, A. & Chandler, A. C.	Texas 1 case	2½ years	D. variabilis Say	"Could not move in bed." Especially back weakness.	No	6 hrs.	1 day. Well
Barnett, E. J.	Idaho 1 case	6	D. andersoni Stiles	Ataxia, paralyzed legs, weak arms, nystagmus.	No	1 day	1 day. Well
Amesse, J. W. & Lyday, J. H.	Colo. 1 case	4	D. andersoni Stiles	Paralysis arms and legs.	Yes In respirator 18 hours	3 days	4 days. Well

* Patient did not synchronize so was removed immediately.

The exact method of removal of the tick is important because the head must be removed completely and not left buried. Various methods have been used; such as, the application of carbolated petrolatum, kerosene, chloroform, heat, excision or gentle traction. In one case, when the tick was still in place, it was lifted off with forceps, alive, and with the head attached. If there had been any resistance, the petrolatum covering would have forced the tick to move to breathe. It could then be removed. A lighted cigarette may be used to touch the tick to force its release. If necessary it can be lifted with forceps and a superficial layer of epidermis excised with the head. In any case it is important to examine the tick to be certain that the head is not broken off and not left attached in the skin, and to make certain also that all ticks are removed.

Case 1, A.L.: A nine-year-old white female was sent to the hospital on July 16, 1947, with a referring diagnosis of poliomyelitis. Chief complaint was dizziness which had been present five days. Twelve days before the onset she had visited in a rural area where there were known cases of poliomyelitis. She seemed well until five days before admission, when she began to play as if intoxicated and fell while walking. Three days before admission she became so weak she could not move from her bed. There was no pain nor fever. A local physician was called who found her weak and without the usual peripheral reflexes. The following day she was unable to use her hands well. Diplopia and increasing weakness were noted. At this time she was unable to suck because of weakness of her facial muscles. Hand weakness was noted for two days before admission with slight pain in the arms; and abdominal pain with occasional vomiting was present on the day of admission. The weakness in her legs had been constant, but was not a complete paralysis. The patient had a dry non-productive cough.

A tick had been seen crawling on the patient's leg about ten days before and was removed immediately. No tick bite was known.

On physical examination the patient was lying on her back with her mouth open. She appeared apprehensive and could not rise unassisted to the sitting position. She was clear mentally and answered questions well, not complaining of any pain. She spoke with a nasal voice and phonated poorly. No skin lesions were seen. The eyes showed dilated pupils and a lateral nystagmus. The mouth was asymmetric grossly, the lips being pulled slightly to the left, with the uvula deviated to the right. Tonsils were of moderate size and not injected. Neck showed some stiffness and no adenopathy. Chest showed paradoxic respiration. The patient was unable to forcibly expand her chest, but constantly used the abdominal muscles. The rest of the examination was negative except for the neurologic findings. The biceps, triceps, abdominal, knee and ankle jerk reflexes were absent. There was a negative Babinski sign and no plantar reflex response. Only the radial reflexes were slightly positive bilaterally. The extremities showed generalized weakness in flexion and extension of the elbows, wrists and shoulders, while there was no localized spasm. The patient showed slight weakness in both legs, particularly on straight leg raising. The legs seemed somewhat stronger than the arms, although she tired easily in using any extremity. There was no impairment to sensation. There was no abnormality of extra-ocular movements. The tongue protruded in the midline.

Laboratory studies. The blood revealed a hemoglobin of 15 gm./100 cc. with 4,940,000 red cells, 9,650 white cells, 74% polymorphonuclears, 24% lymphocytes, 1% eosinophils, 1% large mononuclears. The urine was normal. The spinal fluid showed no cells, 10 mg./100 cc. of protein, 643 mg./100 cc. of chloride, 72.5 mg./100 cc. of sugar. Smear and culture were negative. The spinal fluid three days later showed a cell count of 3 lymphocytes with 10 mg./100 cc. of protein, sugar 50 mg./100 cc., chloride 749 mg./100 cc., culture and smear again negative. Blood agglutination tests for typhoid, paratyphoid, brucellosis, Proteus OX 19, and Proteus OX 2 were negative.

Clinical course: The patient's temperature, which had been 38.5°C. on admission, dropped in a few hours to about 36.1°C. Respiration became increasingly slow and difficult, and during the evening of admission she was placed in a respirator, where she synchronized her respirations well. After being very restless, having an excessive amount of saliva, and showing increasing difficulty in phonation, she became quiet and slept in the respirator. The following day there was no apparent change in the weakness described previously, but she did have slight difficulty in swallowing. After the patient had been in the hospital for about 24 hours, a fully engorged tick, 1 cm. x 1¼ cm. was discovered in her hair near the left occiput. It was removed immediately. Further search of the scalp

revealed no other ticks. The patient remained in the respirator a second night, but seemed to be considerably stronger in a few hours. By the next morning weak knee jerks could be obtained, and the patient was moving her arms and legs about freely without any pain. The voice was more normal and there was no difficulty in swallowing. The respirator was gradually discontinued during the next twenty-four hours. Two days later the patient was sitting up and walking, although still somewhat dizzy. She remained afebrile, appearing entirely normal when discharged four days after admission.

The tick, illustrated in Figure 1, was identified by Mr. P. N. Annand, Chief, Bureau of Entomology, United States Department of Agriculture, as a female dog tick, Dermacentor variabilis Say.

Case 2, M.L.M.: A ten-year-old white girl was referred to the hospital from a rural area with a diagnosis of poliomyelitis. Her complaint was inability to walk. Five days before admission, she had fever, moderate nausea and weakness of her legs. Her local physician, believing she had a sore throat, prescribed a "sulfa" drug. She was able to return to school after one day. Three days before admission she lost her appetite, ataxia increased, but no pain was noted. On the day of admission

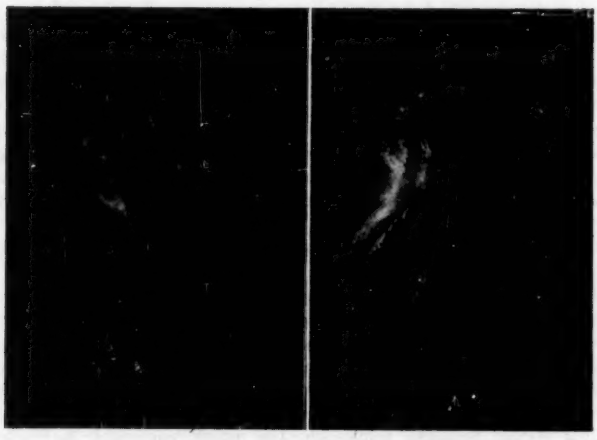

FIG. 1. Wood tick, Dermacentor variabilis Say, removed from Case 1.

she was unable to walk, due to paralysis of her legs. The back and arm weakness prevented her moving in bed. There was no fever, and no further nausea. Swallowing, speech, and respiration were not disturbed.

About an hour before admission, while the patient's mother was combing her hair, she discovered and removed a "large seeded wood tick" from her scalp. The tick was not saved for identification.

On physical examination the patient was acutely ill, but afebrile. She was unable to move in bed, but said she had no pain. The skin was clear except for a small area of redness on the scalp where the tick had been removed. The eyes showed dilated pupils and normal fundi. The neck was not rigid. The respiratory muscles were used satisfactorily. There was marked weakness of the back, neck and abdominal muscles. The legs showed a complete flaccid paralysis. The arms were generally weak, but could be moved slightly. There was no muscle spasm nor tenderness. There was a weak biceps reflex response. The abdominal reflexes were absent, as were the knee and ankle jerks and plantar reflexes bilaterally. The Kernig's and Brudzinski's signs were negative. There was no change in sensation and no impairment of cranial nerve function.

Laboratory studies: The blood count and urinalysis were entirely normal. On admission the spinal fluid showed no cells, a protein of 10 mg./100 cc. and a negative mastic test. A lumbar puncture was done two days later and the spinal fluid showed 3 lymphocytes and 40 mg./100 cc. of protein, but on discharge only 20 mg./100 cc. protein with 3 lymphocytes was found in the spinal fluid. Serum calcium was 9.5 mg./100 cc. and phosphorus 4.0 mg./100 cc.

Clinical Course: On the night of admission the patient was so weak that when she was placed

in position for a lumbar puncture, she could not move when it was done. The following morning she was sitting in bed with only mild dizziness. There was moderate ataxia, and weak knee jerks were elicited. At the end of 48 hours she was more steady and walked about without assistance. On discharge six days after admission the normal reflexes were present throughout and all weakness had vanished. A recent letter from her mother states there had been no further trouble.

Case 3, W.L.M.: An eighteen-month-old white boy was observed on March 22, 1945 to have difficulty in walking, without other evidence of illness. The next day the condition had progressed so that there was marked weakness of the legs as well as incoordination. That night he developed weakness and incoordination of both arms. Two days later, besides the previous symptoms, he experienced difficulty in swallowing. He was then admitted to the hospital, four days after the onset of his illness.

Physical examination showed that he was in no apparent pain. He was somewhat listless, though conscious, and entirely rational. There was a flaccid weakness of all extremities with almost complete paralysis of the legs. He was unable to sit alone; and, when supported in a sitting position, he could not hold his head erect due to weakness of neck muscles. He had difficulty in swallowing and attempts to drink water resulted in choking. The rest of the examination was essentially negative, except for the scalp. Careful search disclosed a partially engorged tick, the size of a grain of corn, about two inches behind the left ear. This was removed in the usual manner.

Laboratory studies revealed a hemoglobin of 11 gm./100 cc.; red blood cells, 3,430,000; white blood cells, 5,950 with 54% polymorphonuclears and 46% lymphocytes.

Clinical course: Nine hours later the child had regained fairly good use of his extremities, was able to hold his head erect, and could swallow food fairly well. After 24 hours the paralysis had all cleared. He could walk erectly and swallow without difficulty. He was bright and playful and seemed entirely normal when discharged the next day.

Summary

The three cases of tick paralysis occurring in Virginia in the last two years are presented. One of these cases required the respirator. In this case the tick was identified as Dermacentor variabilis Say.

Only ten other cases of tick paralysis have been reported in the eastern United States. A summary of the findings of these cases is charted. Three recent cases in the west, also charted, showed only one case needing a respirator. A brief review of the epidemiology, symptoms, signs and treatment of tick paralysis is given.

The seriousness of tick paralysis, if the tick is not found and removed, and the usual dramatic recovery after removal make it extremely important to consider this condition in any case showing such neurologic manifestations as those presented in this report. During an epidemic of poliomyelitis, tick paralysis should always be kept in mind as a possible alternative diagnosis.

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SPANISH ABSTRACT

Paralisis por garrapatas. Tres casos de tick paralitico en Virginia con un sumario de todos los casos reportados en los Estados del Oeste

Tres casos de tick paralitico, han sido vistos en Virginia en los ultimos dos años, ellos presentan el cuadro usual de una paralisis ascendente no dolorosa en un niño apiretico per irritable. Conteo de sangre, analisis de orina y examen de liquido cefalo raquideo fueron normales. Uno niño avanzo hacia el establecimiento de una paralisis facial, disfagia y marcada debilidad respiratoria al extremo que hubo que mantenerlo en "el respirador" por dos dias. Los otros tenian debilidad de los brazos, piernas y tronco. La extraccion de una garrapata del cuero cabelludo fue seguida de un total restablecimiento dos o tres dias despues. La garrapata fue identificada como. Dermacentor variabilis.

La similaridad de la paralisis con la poliomielitis obliga a considerar la importancia etiologica de la garrapata en la paralisis ascendente.

Una breve historia de la enfermedad, discusion de su trasmision, distribucion, diagnostico y tratamiento se acompañan con un sumario de 10 casos observados en New York, Carolina del Norte, Carolina del Sur, Georgia y Kentucky.

Muchos casos han sido reportados en el oeste de los Estados Unidos, Canada y Australia, pero estos son los unicos reportados hasta ahora en el este del rio Mississippi.

1200 E. Broad St.

CONCENTRATION OF URINE SOLUTES BY YOUNG INFANTS

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SITUATIONS requiring an estimate of overall water expenditures are frequently encountered during infancy. The provision of an adequate quantity of water for the kidneys should always be a primary consideration, irrespective of the type of food or repair solution prescribed. Definition of minimal renal water requirement for infants is, therefore, of considerable clinical value.

This paper presents data concerning approximately maximal concentration of the urine solutes found for young infants, thereby providing information applicable to definition of the minimal renal water requirement. The range of water conservation by the kidneys is incidentally disclosed.

METHODS

Since both the load of substances presenting for excretion and the quantity of water available to the kidneys influence urinary concentration, the plan was to maintain the usual load while decreasing the water intake. This was accomplished by studying each infant during three 24 hour periods, the first on a usual diluted evaporated milk mixture, the last two periods while on an undiluted evaporated milk mixture. During the first period each infant received a food mixture providing about 130 calories per kilogram of body weight composed of evaporated milk and additional carbohydrate diluted with water. The added water averaged 55% of the total volume. Following this period the infants were placed on a food mixture of the same or slightly larger amounts of evaporated milk and carbohydrate, but with no added water. After 24 hours and again after four or five days on undiluted food mixtures, periods two and three were carried out.

In each period measurements of initial and final body weights, the weight of intake and stools and the volume of the urine were recorded. In addition, the following determinations were made: freezing point depression, specific gravity, creatinine, pH and nitrogen in the urine; water content of intake and stools; and nitrogen in the intake. The carbohydrate content of the intake was calculated from the composition of the food mixtures.

The limit of the kidney's ability to do osmotic work presumably defines maximal urinary concentration (Newburgh).[1] Therefore, the number of osmotically active particles in the urine, designated as solutes and expressed in milliosmoles, will be considered. The concentration of such particles, that is the osmolar concentration of the 24 hour urine samples, was determined by dividing the degrees of freezing point depression by the factor 1.86. Specific gravity determinations were also made, but the more physiologically correct osmolar concentrations here describe minimal urine volume, which accord-

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ing to Gamble and Butler is determined by output of solutes per 24 hours divided by maximal concentration of solutes in the urine.[2] Calculations of water lost from the lungs and skin and of water balances were made according to the following formulas:[3] I.W. $= (W_1 - W_2) + (w_f - w_e) - (CO_2 - O_2)$, and W.B. $= (W_2 - W_1) + (S_e - S_f) + (C + 0.54P + F)$ where the abbreviations signify: I.W. = water lost from the lungs and skin; W.B. = water balance; W_1 and W_2 = initial and final body weights; w_f and w_e = weight of food and weight of excreta; S_e and S_f = solids of excreta and solids of food; O_2 and CO_2 = weight of oxygen consumed and weight of carbon dioxide given off; C = grams of carbohydrate burned; P = grams of protein

TABLE I

DATA FOR CALCULATION OF I.W. AND WATER BALANCE

Pt.	Period	W_1	W_2	w_1	w_e	S_f	S_e	C	P	F	(CO_2-O_2)
		kg.	kg.	gm.	gm.	gm.	gm.	gm.	gm.	gm.	gm.
A	I	4.881	4.866	512	322	94	20	44	9	24	17
A	II	4.969	4.914	367	248	125	31	55	11	19	22
A	III	4.923	4.969	346	147	105	19	52	10	20	21
B	I	4.196	4.223	557	344	95	10	46	9	17	19
B	II	4.237	4.383	496	154	204	14	68	10	7	29
B	III	4.201	4.267	385							
C	I	3.702	3.725	503	317	73	12	45	4	14	18
C	II	3.689	3.767	269	66	77	10	47	6	13	19
C	III	3.762	3.795	249	80	77	10	43	7	14	18
D	I	3.013	3.052	740	569	62	20	50	8	3	21
D	II	3.003	2.967	254	135	82	14	44	6	7	18
D	III	3.024	3.068	259	109	87	13	44	6	7	18
E	I	3.400	3.427	571	332	94	13	50	7	8	21
E	II	3.515	3.483	321	144	88	17	54	8	7	23
E	III	3.400	3.427	306	129	83	18	53	11	5	23

burned, derived from urinary nitrogen multiplied by 6.25; and F = grams of fat burned. This was calculated from estimated caloric expenditure minus calories from C plus P divided by 9.3. The carbohydrate burned was assumed to equal the amount ingested. The value of the expression $(CO_2 - O_2)$ was obtained by multiplying P by 0.14, C by 0.41 and F by minus 0.08.

Table I presents these data for the five male infants studied for three periods each. No errors in collections were observed, except for the third period on patient B. All infants were apparently without renal disease and were in good health, although convalescent from recent acute infections. The age, height and weight of each infant at the beginning of the study are given in Table II.

The assumptions made were that all the carbohydrate fed was burned, that the average daily caloric expenditure was 90 calories per kilogram and that the urinary solids could be calculated from the specific gravity by means of Long's coefficient. Despite the limitations imposed by these assumptions, it was felt that the figures for water balance were of sufficient accuracy to indicate any considerable alteration in total body water.

The measurements from the 24 hour urine specimens are recorded in Table III, and the values for the components of the water balances are given in Table IV.

Determinations of the pH and the concentrations of sodium, chloride and bicarbonate in the serum of patients A and B at the beginning of the undiluted formula regime and after five days on this diet revealed no significant changes. Daily blood nonprotein nitrogens in these two patients showed no significant rise during the five days on lowered fluid intake.

TABLE II

Patient	Age	Height	Weight
	days	cm.	Kg.
A	30	56	4.88
B	43	55	4.20
C	50	54	3.70
D	56	53	3.01
E	65	53	3.40

TABLE III
TWENTY-FOUR HOUR URINE SPECIMENS

Pt.	Period	Volume	Osmolar Conc.	Total Solutes	Specific Gravity	Nitrogen
		cc./kg.	osM/l	mosM/kg.		gm./kg.
A	I	52	.473	25	1.014	0.29
A	II	27	1.075	29	1.035	0.35
A	III	20	1.473	29	1.037	0.33
B	I	81	.376	30	1.011	0.36
B	II	31	.973	30	1.030	0.38
C	I	75	.285	21	1.010	0.18
C	II	17	1.177	20	1.038	0.24
C	III	20	1.253	25	1.038	0.31
D	I	161	.226	37	1.007	0.43
D	II	34	.914	31	1.027	0.31
D	III	27	1.053	28	1.032	0.33
E	I	91	.311	27	1.010	0.33
E	II	31	1.145	36	1.036	0.37
E	III	31	1.177	37	1.035	0.50

DISCUSSION

The water restriction imposed by the undiluted evaporated milk mixtures produced a progressive rise in the concentration of the urine solutes. The average value for osmolar concentration reached after four or five days of lowered fluid intake was 1.24 osM/l. One patient attained 1.47 osM/l which is the limit reached by healthy adults. This patient, A,

TABLE IV

COMPONENTS OF WATER EXCHANGE IN GRAMS PER KILOGRAM PER DAY

Pt.	Period	Water of Intake	Water of Oxidation	Urine Water	Stool Water	Water from Lungs & Skin	Water Balance
A	I	86	12	51	11	38	− 3.3
A	II	49	12	26	18	31	14.2
A	III	48	12	19	7	26	7.5
B	I	110	12	79	0	40	2.4
B	II	68	12	29	4	39	8.6
C	I	116	12	74	9	39	6.2
C	II	52	12	15	0	28	19.8
C	III	46	12	19	0	32	6.6
D	I	224	12	160	21	37	17.8
D	II	58	12	32	9	46	−16.8
D	III	57	12	26	6	29	7.9
E	I	140	12	90	4	56	2.3
E	II	67	12	29	7	53	−10.9
E	III	65	12	29	3	37	7.6

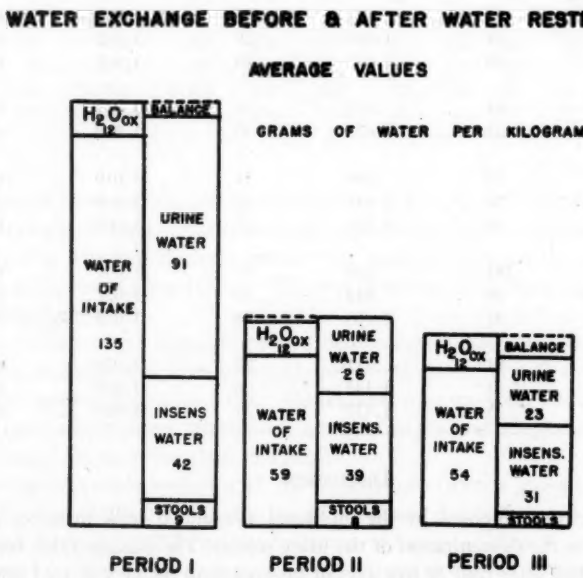

FIG. 1

was the youngest, but also the largest, infant of the group and had the smallest water intake per unit of renal load.

It would seem that these high concentrations of urine solutes by normal infants are valid statements of the concentrating ability of their kidneys and are within the normal range of renal adjustment to available water. There is no evidence from clinical observations, daily weight measurements nor the laboratory data that any significant disturbance

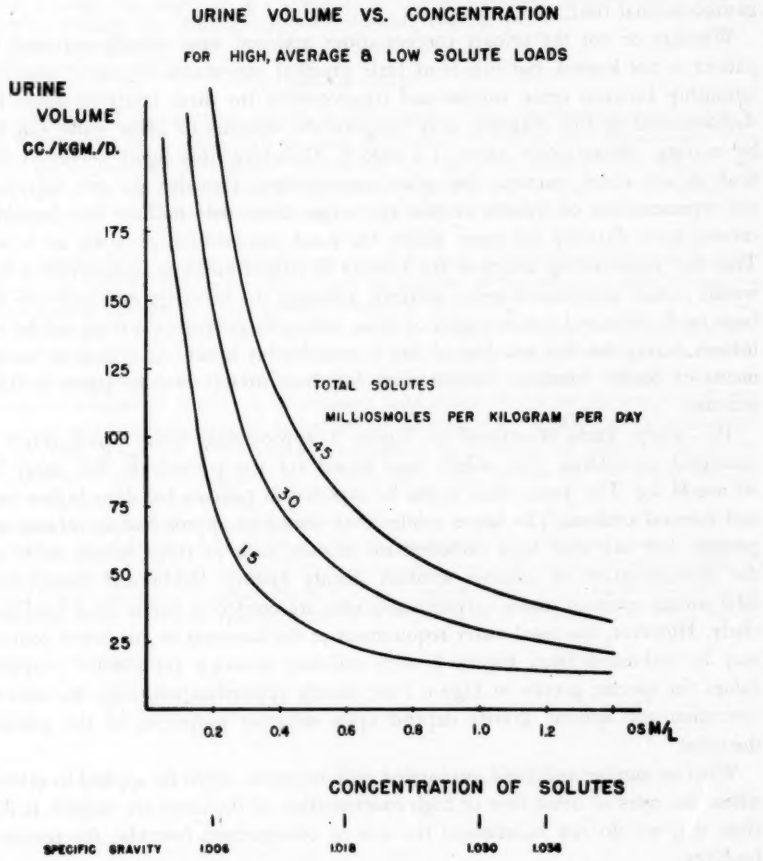

FIG. 2

had been produced. The water balances for each patient (Table IV) and the averages of the group for each period, represented in Figure 1, show that appreciable loss of body water was not produced by this degree of fluid restriction for five days.

That the challenge of the extensive decline in fluid intake was met successfully is evidenced by the water balances for each period. The dominant role of the kidney in achieving this task is clearly shown by the chart. Eighty-five per cent of the decrease in water expenditure during the restriction of water intake was attained by reduction in

urine water without reduction in the solutes excreted. The slight lowering of water lost from the lungs and skin and in the stools accounted for the rest of the water saved. The reduction of fluid intake to 42% of its customary value resulted in only one-fourth of the usual amount of urine being produced. The clinical significance of these findings is not so much that intake may be reduced to one half, but rather that, when 150cc. of fluid per kilogram of body weight are supplied, about 65cc./kg. is present as a margin of safety which may be utilized to cover abnormal losses from the skin and gastrointestinal tract.

Whether or not the urinary concentrations achieved were actually maximal for each patient is not known, but this is of little practical importance. Figure 2 depicts the relationship between urine volume and concentration for three levels of solute load. As demonstrated in this diagram, only insignificant amounts of urine water can be saved by moving concentration above 1.2 osM/l. Therefore, this figure serves as the practical, if not actual, maximal for urine concentration. Provided the five infants studied are representative of infants in this age range, these data indicate that healthy young infants have virtually the same ability for renal conservation of water as have adults. That the concentrating ability of the kidneys in infants suffering from severe dehydration would remain unimpaired seems unlikely, although the necessary measurements have not been made. Maximal concentration of urine solutes by premature infants and by full term infants during the first ten days of life is considerably lower. According to the measurements of Smith[4] maximal concentration for these infants may be taken as 0.6 to 0.7 osmolar.

The solute loads illustrated in Figure 2 approximate those which might be encountered in infants. The solute load found for the patients in this study is about 30 mosM/kg. The higher load might be expected in patients fed diets higher in protein and mineral content. The lower solute level would be approached in infants with low protein, low salt and high carbohydrate intakes, such as from human milk, or from the administration of glucose solution during fasting. Additional measurements of total solutes excreted under varying conditions are needed to define renal load more precisely. However, the renal water requirement at the maximal or any lower concentration may be estimated from Figure 2 with sufficient accuracy for clinical purposes. The values for specific gravity in Figure 2 are merely approximations since the osmolar concentration and specific gravity depend upon different properties of the substances in the urine.

Whereas similar undiluted evaporated milk mixtures might be applied to other studies when low rates of urine flow or high concentration of the urine are desired, it should be clear that we do not recommend the use of concentrated formulas for routine infant feedings.

SUMMARY

The water exchange of five infants, one to two months old, is described during the water restriction imposed by feeding food mixtures of undiluted evaporated milk.

It is shown that the urine solutes can be concentrated to the level of 1.2 osM/l. The high order of the concentrating ability by the kidneys of these young patients means that, in healthy infants one month old or older, over half of the water provided by the infant's usual food can be conserved to cover abnormal losses by other routes of water removal.

A chart is given for the estimation of the renal water requirement for infants at any given concentration of urine solutes on a variety of intakes.

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Spanish Abstract

La determinacion del requerimiento minimo de agua para la mejor concentracion por el riñon de las sustancias disueltas en la orina, seria de gran importancia en clinica. Este requerimiento esta determinado por la cantidad de sustancias disueltas en la orina de 24 horas dividida por su concentracion maxima. Los datos presentados en este trabajo referentes a la concentracion maxima en la orina de las sustancias en ella disueltas, en los niños pequeños pueden ser aplicados a esta determinacion.

Los datos fueron obtenidos determinando los cambios del agua y de la concentracion de la orina en cinco niños de 30 a 65 dias de nacidos, durante un regimen de restriccion de agua impuesto a traves de un regimen alimenticio a base de leche evaporada no diluida.

Pudo probarse que la reduccion de un 42% en la oferta de agua no produce disturbios aparentes en el balance hidrico de estos niños, el 85% de la disminucion del liquido expulsado durante el regimen de restriccion de agua afecto solo el volumen total sin alterar la cantidad le sustancias disueltas.

Las sustancias disueltas en la orina se concentraron hasta niveles de 1.2 osmoles por litro. El alto valor de la capacidad de concentracion de los riñones de estos niños explica que en condiciones normales, en niños de un mes o mas viejos, aproximadamente la mirad del agua proveniente del alimento usualmente dada a ellos, puede ser retenida para cubrir las perdidas de liquido que por otras vias pueda haber experimentado.

Una grafica se ofrece con el requerimiento minimo de agua que el riñon del niño solicita en relacion con una concentracion dada de las sustancias disueltas en la orina. Este cuadro revela que para una oferta media de liquido, cuando las sustancias estan bien concentradas el maximo requerimiento renal minimo de agua seria solamente de 25 a 30 cc. por Kgm. de peso y por dia, siendo asi, si la concentracion urinaria es baja (densidad 1010) se requeriria una eliminacion de 80 a 100 cc.

789 Howard Avenue

IMMUNIZATION AGAINST SCARLET FEVER WITH TANNIC ACID-PRECIPITATED ERYTHROGENIC TOXIN

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INTRODUCTION

ACTIVE immunization against scarlet fever has been practiced rather haphazardly since it was first introduced by the Dicks[1, 2] in 1924. Their method required the inoculation of the raw unmodified erythrogenic toxin at five weekly intervals using 500, 2,000, 8,000, 25,000, and 80,000 skin test doses. In some series, reversal of the Dick reaction was reported in 90% to 95% of the persons so treated. A subsequent attack rate of 0.5% in the inoculated as compared to 14% in some uninoculated control groups was observed. However, such severe reactions were encountered in from 10% to 30%, occasionally more, of the immunized subjects that this offered serious objection to its widespread use.

Many attempts were made to eliminate these objectionable features. By growing the hemolytic streptococcus (NY-5 strain) in a special medium, Veldee[3, 4, 5] succeeded in obtaining a highly potent erythrogenic toxin. This toxin could be highly purified by a single precipitation with ammonium sulfate; and, when followed by further precipitation with tannic acid, it resulted in a relatively insoluble toxin preparation with a markedly reduced total nitrogen content. Faragó[6, 7, 8] has reported similar results with a refined and aluminum hydroxide adsorbed toxin.

The main advantage of such preparation is that the immunizing agent, although still a raw toxin, is considerably purified and rendered relatively insoluble. It is thus similar to a toxoid in that it is more slowly absorbed, permitting a reduction in the size of the dose and total number of injections required as compared to the former method of immunization.

The inoculation of unmodified scarlatinal toxin frequently produces systemic reactions manifested by vomiting, diarrhea, fever, and a rash which is caused by the sudden liberation of soluble toxin into the blood stream. This is followed by rapid elimination of the toxin, and therefore there is a relatively short period of antigenic stimulation. With the reduced dosage and retarded absorption obtained with the insoluble toxin, the systemic reactions are minimized to a point where the vomiting threshold is not exceeded and the reaction is chiefly of a local type. Moreover, the slow absorption would permit longer contact between antigen and tissue and consequently a better immune response.

Veldee and associates[5] have conducted a four-year field study with the tannic acid-precipitated erythrogenic toxin. They followed the Dick reactions and the scarlet fever morbidity in a large group of immunized children in both rural and urban schools. They found that the most practicable and effective method for immunization was three gradu-

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ated injections* (750, 3,000 and 10,000 STD) spaced at two-week intervals and injected in 0.1 cc. doses intradermally, preferably on the outer surface of the upper arm. Reaction at the site of inoculation occurred in practically every individual but in varying degree. Induration was always present and some tenderness on palpation. There was redness and itching varying with the extent of redness. In larger areas of redness and induration, there was localized heat. A vesicle the size of a pinhead containing clear serous fluid formed at the site of the needle insertion in those with more intense local reactions. Four children gave reactions of an allergic character, but these were mild and did not require specific treatment.

Approximately 85% of those treated became Dick negative. A few individuals subsequently lost this negative phase over a period of 44 to 47 months, but there was actually an improvement in the percentage for the entire group during this interval. From the analysis of the morbidity data, they concluded that a negative Dick reaction is a dependable index of protection against clinical scarlet fever. These data showed also that "the injections afford protection against an attack of scarlet fever to the extent that they bring about a negative Dick Test," and that the protection is as good as that afforded by the acquisition of a negative reaction through clinical or subclinical exposure.

Methods and Results

Since purified and tannic acid-precipitated scarlet fever erythrogenic toxin preparations are now becoming available for general use through biologic and pharmaceutic manufacturers, we thought it advisable to give the products of two such firms further clinical trial. Accordingly, groups were selected in whom active immunization against scarlet fever might be particularly indicated; namely, adults who react positively to the Dick test and who would frequently be in contact with the disease (student nurses) and institutionalized children of pre-school and school age in whom exposure to scarlet fever is likely to occur at frequent intervals.

TABLE I

Results of Inoculation with Tannic Acid Alum-Precipitated Toxin (Lederle)

Group	Dick Positive	Immunizations Completed	Dick Negative After Immunization
Student Nurses Group I	18	18*	15 (84%)
Student Nurses Group II	64	62	51 (82%)
Orphanage A Males 5–15 years	72	65	48 (73%)
	17	17	16 (94%)
Total		162	130 (80.2%)

* One of 3 nurses who remained Dick positive after immunization subsequently developed scarlet fever.

* For adults four doses are recommended (500, 2,000, 6,000 and 10,000 STD).

Subjects were selected for this study by Dick testing all the available student nurses at the City Hospital of Cleveland and the children of four orphanages in the Cleveland suburbs. All giving a positive Dick reaction were inoculated. Two preparations were employed. In the first series a tannic acid alum-precipitated toxin* was used, made according to the method of Veldee except for the addition of alum to reduce the rate of absorption further. In the second series, a preparation† made according to the original Veldee technic, outlined above, was used. In all groups (including nurses) the three doses (750, 3,000, and 10,000 STD) recommended by Veldee were given, each in a volume of 0.1 cc. intradermally. The deviations from his method were: (a) weekly instead of two-week intervals were used; (b) the flexor surfaces of the lower arm were used alternately instead of the upper outer arm, so that the reactions could be more adequately observed and measured.

At the end of approximately six weeks following the last injection, the groups were retested for their reaction. In many instances they were retested again after a subsequent interval or intervals with 1, 2½, 5, or 7½ STD to determine the extent of their Dick reactivity. Records were also kept of those who developed scarlet fever during the follow-up period of about one and one-half years from inception of the study to the present report. The results are tabulated below.

The reactions following the immunizing doses with the preparation used in the first series were nearly all local. Only a few had no reaction. The majority had areas of erythema at the site of injection from 2.5 cm. in diameter to, in rare cases, about 15 cm. In some, a minute papule or vesicle would develop surrounded by an areola of varying diameter; occasionally this would be indurated. The reactions lasted for a few days and subsided within a week, at which time there remained a small area of desquamating, slightly indurated skin. Only a few complained of painful arms but in some of these there was an accompanying axillary adenopathy with fever which lasted for about one day. Most of the inoculated areas presented a small, firm nodule in the center of the desquamating site. These nodules disappeared within two to three weeks, occasionally persisting longer. In no instance was there any necrosis at the site of inoculation.

The reactions to immunization injections in the second series were somewhat similar to those described in the first except that there being no alum in this preparation, no subcutaneous nodules persisted.

While there were a few sporadic cases of scarlet fever in these institutions and a small outbreak in Orphanage A during the 1½ years observation in this study, no cases occurred among those immunized whose Dick reaction became negative. The few cases that did occur in our inoculated groups were either in individuals who failed to become negative Dick reactors after vaccination, or in those whose negative phase was of short duration, as was the case in two instances.

Discussion

In general, our data tend to confirm and support the results obtained by Veldee and associates[4] in 1941. In the first series of 162 individuals immunized, 80.2% became Dick negative, in the second series of 200 persons, 92% became negative, an average of 86.7% for the entire group of 362 subjects studied.

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* Supplied through the courtesy of Lederle Laboratories, Inc., Pearl River, N.Y.

† Obtained through kindness and cooperation of Wyeth, Inc., Phila., Pa.

The series are too small and the follow up not sufficiently long to indicate whether one preparation is superior to the other. Rather, it would appear that both preparations are equally effective in causing a reversal of the Dick reaction with a minimum of objectionable side reactions.

No cases of scarlet fever occurred in any of the inoculated individuals who responded to immunization and who remained Dick negative during the one to one and one-half year period of observation. The two cases observed in the vaccinated group took place about one year after immunization was begun in two boys who had become Dick negative

TABLE II

RESULTS OF INOCULATION WITH TANNIC ACID-PRECIPITATED TOXIN (WYETH)

Group	Dick Positive	Immunization Completed	Dick Negative After 6–8 Weeks	Re-test Interval	Re-tested	Neg. 1 STD	Neg. 2½ STD	Neg. 5 STD	Neg. 7½ STD
Student Nurses	23	21	17 (81%)	5 mos.	13	13	11	—	6
Orphanage A	14	14	13 (92%)	—	—	—	—	—	—
Males	66*	63	60 (95%)	4 mos.	61	60	57	48	—
5–15 yrs.	17	17	13 (76%)	5 mos.	14	14	10	—	—
Orphanage B Mixed 2–5 yrs.	15	14	13 (91%)	2 mos.	12	9	—	—	1
Orphanage C Females 5–15 yrs.	27	27	27 (100%)	5 mos.	26†	—	20	13	—
Orphanage D Mixed 5–15 yrs.	44	44	41 (90%)	6 mos.	22	—	18	13	—
Total		200	184 (92%)						

* Six boys in this group developed scarlet fever during this study. Four of these had failed to reverse their positive Dick reaction following immunization. Two became negative after immunization but reversed to positive 8 months later, 1 month before acquiring scarlet fever.

† Thirteen of these were available for a second re-test one year later. All were negative to 1 STD.

when tested six weeks after the last immunizing dose but again had reverted to positive when they were retested eight months later, one month before they acquired the disease.

The negative Dick reaction acquired by this type of immunization lasts at least six months. In one small group of 13 tested 1½ years later, all were still Dick negative. A few cases may revert within a year. The majority of the immunized individuals remain negative also to 2½ STD of erythrogenic toxin and over one-half of those tested are negative also to 5 STD. Only a few fail to react to 7½ STD. If a negative Dick reaction to the 1 STD ordinarily used in the Dick test is a reliable index of immunity to clinical scarlet fever, then these results would indicate that a rather good antigenic stimulation

is afforded by this method of immunization; and, consequently, ample protection should follow.

However, we have seen (as have others) an occasional case of scarlet fever in individuals with negative Dick reactions. Various reasons have been given to explain this —pseudo-reactions, heterologous toxins, variations in the durability of the negative phase, etc. As a case in point and to illustrate the fluctuation that may occur in groups of Dick tested individuals at intervals, the following data may be of interest.

At one of our orphanages in December 1943, 335 boys were Dick tested prior to an investigation of the effect of multiple antigen inoculations. Of these, 87 were Dick positive and 241 negative. Later that month, 328 boys received their first dose of one of several

TABLE III

NEGATIVE CASES

Pre-Inoculation Dick Test 12-1-43	1st Post-Inoculation Dick Test May 1944		2nd Post-Inoculation Dick Test Oct. 1944		3rd Post-Inoculation Dick Test Sept. 1945		4th Post-Inoculation Dick Test Sept. 1946	
Negative Cases 241	Positive	86	Positive	5	Positive	8	Positive	2
	Negative	141	Negative	158	Negative	108	Negative	75
	Untested	14	Untested	78	Untested	125	Untested	164
	Total	241	Total	241	Total	241	Total	241

POSITIVE CASES

Pre-Inoculation Dick Test 12-1-43	1st Post-Inoculation Dick Test May 1944		2nd Post-Inoculation Dick Test Oct. 1944		3rd Post-Inoculation Dick Test Sept. 1945		4th Post-Inoculation Dick Test Sept. 1946	
Positive Cases 87	Positive	54	Positive	10	Positive	9	Positive	5
	Negative	27	Negative	57	Negative	41	Negative	34
	Untested	6	Untested	20	Untested	37	Untested	48
	Total	87	Total	87	Total	87	Total	87

preparations composed of three—some five—antigens. All, however, contained scarlatinal toxin. In January 1944, 315 boys received their second dose and in March 1944 the third dose was injected into 278 boys. Subsequently, the boys were Dick tested at several intervals. The results are shown in Table III.

These data emphasize the variations in the Dick reaction that may occur in groups tested at intervals. It is interesting to note particularly that in the group of 241 negatives, 86 of 227 retested five months later were then positive and small numbers of these remained positive during the ensuing three years. Such variabilities in the Dick reaction serve to complicate the clinical evaluation of a vaccine to some extent, although they do not vitiate the overall results in studies conducted with large groups.

One might be tempted to question the value of any immunization procedure against scarlet fever, for it may be argued that even if the method were unequivocally effective in eradicating the toxic manifestations of the disease, it would not afford any protection

against invasion by the streptococci. Might not those immunized against the erythrogenic toxin develop cases of so called *"scarlatina sine eruptione"* or in other words, a streptococcicosis which would not be so readily recognized as the case with the rash?

That the streptococcus, itself, must somehow be taken into account was feebly recognized by Gabrichevski[9, 10] who as early as 1905 advocated immunization against scarlet fever with bacterial vaccines. This question was again raised in 1939 by Kolmer[11] who reported experimental data to demonstrate the superiority of antigens prepared with toxin and the incorporation of bacterial vaccines made from hemolytic streptococci. The problem cannot be solved that simply, however. The multiplicity of types in the group A streptococci, the evidence for the presence of at least one other antigenically distinct erythrogenic toxin, and the fact that there exist some strains of staphylococci capable of producing an erythrogenic toxin adds further to the complexities of this problem.

The role of the erythrogenic toxin in the complications and sequelae that may follow infection with toxogenic streptococci is not yet entirely clear. If it should be shown ultimately that there is a significant interrelationship in the disease-producing mechanism between the organism and its toxin, then our approach toward prophylaxis and therapy would have to be guided accordingly. Alternatively, if scarlet fever is, as some believe, a dual disease of two independent mechanisms, a bacterial invasion and a toxemia, then each of these phases would have to be attacked separately. In the latter instance, immunization against the toxin would be of dubious value, especially in view of the mild cases in recent years, unless it were shown that the toxemia in itself, or a sensitization to the toxin, was responsible for the sequelae which might be averted by immunization.

In its present status, therefore, we would hesitate to recommend widespread use of immunization against scarlet fever. We feel rather that, if it is to be used at all, it should be restricted to certain groups of Dick positive individuals whose contact with the disease or with carriers of toxogenic hemolytic streptococci might be unusually frequent. These would include hospital personnel such as nurses, physicians, attendants, institutional inmates, and military personnel.

Summary

With the use of a purified tannic acid-precipitated erythrogenic streptococcus toxin prepared according to the method of Veldee and given intradermally in three doses of 750, 3,000, and 10,000 STD at weekly intervals, 362 Dick positive individuals, including student nurses and inmates of orphanages, were inoculated. This resulted in a reversal of the Dick reaction in 86.7% of the group.

The majority of those immune to one STD were negative also to 2½ and 5 STD for at least six months, and only a few reversed to Dick positive within a year.

None of the immunized who remained Dick negative developed scarlet fever within the one to one and one-half year observation period.

Two cases of scarlet fever were observed in those immunized, but they had reverted from negative to positive Dick reactions prior to contracting the disease.

Some practical and theoretical considerations regarding scarlet fever immunization are discussed.

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SPANISH ABSTRACT

Con el uso de una toxina eritrogenica precipitada por el acido tanico purificado, siguiendo el metodo de Veldee y utilizando la via intradermica a dosis de 750, 3000 y 10,000 STD, en intervalos de una semana sucesivamente, fueron tratadas 362 personas Dick positivas, incluyendo nurses y demas personal de un orfelinato.

La reaccion de Dick fue negativizada en el 86% del grupo.

La mayoria de aquellos inmunes a una dosis de "Skintest" fueron tambien negativas al 2.5 y 5 STD por lo menos seis meses y solamente muy pocas se hicieron nuevamente Dick positivas dentro del año.

Ninguno de los inmunizados que permanecieron Dick negativos desarrollaron escarlatina dentro de 1 a 1½ año de observacion. Dos casos de escarlatina fueron observados en aquellos inmunizados, pero ellos habian pasado de la reaccion negativa a la positiva antes de contraer la enfermedad.

Los autores discuten consideraciones practicas y teoricas con respecto a la inmunizacion en la escarlatina.

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THE DIAGNOSIS AND TREATMENT OF ATRESIA OF THE ESOPHAGUS AND TRACHEO-ESOPHAGEAL FISTULA

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DURING the past few years there have been an increasing number of reports on the successful operative correction of atresia of the esophagus and tracheo-esophageal fistula.[1, 2, 3, 4]

In the past eight years at the Children's Hospital in Boston, 113 such cases have been operated upon and 57 of the patients have survived.

There are certain facts about normal embryologic development which afford some explanation of these congenital malformations. In early fetal life, the esophagus and

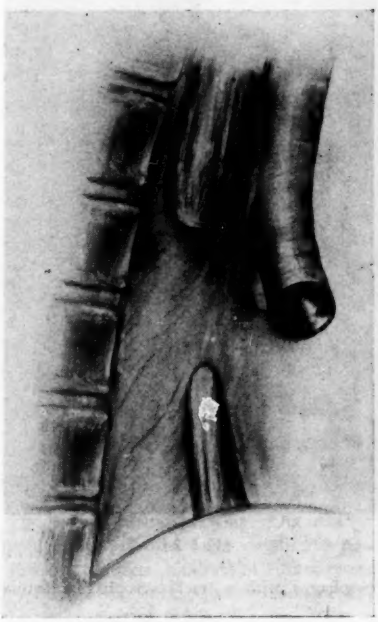

FIG. 1-a

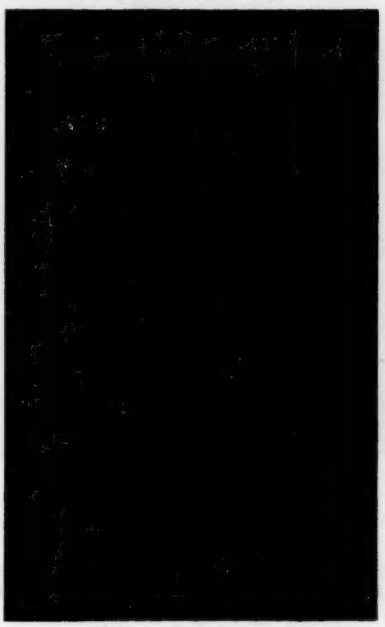

FIG. 1-b

FIG. 1-a. Schematic drawing of atresia of the esophagus without an associated tracheo-esophageal fistula.

FIG. 1-b. A roentgenogram of such a patient is shown above. The upper esophageal pouch which is outlined with lipiodol ends blindly and the absence of a gas pattern in the intestinal tract demonstrates the absence of a tracheo-esophageal fistual to the lower esophagus.

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trachea are one tube, which subsequently becomes divided into two structures by the lateral ingrowth of mesoderm. After this division, the lumen of the esophagus becomes obliterated by the proliferation and concrescence of its epithelial lining. Later, as this solid cord becomes vacuolated and coalescence of the vacuoles occurs, the lumen of the esophagus is re-established. It is probably in the period of separation of the single structure into esophagus and trachea that tracheo-esophageal fistulas develop. Esophageal atresia is probably related to incomplete coalescence of the vacuoles.

The anatomic variations of the anomaly can be divided into five groups. In the simplest form of the anomaly, the upper portion of the esophagus ends in a blind pouch in the upper portion of the chest and the lower esophageal segment begins again as a blind

FIG. 2-a

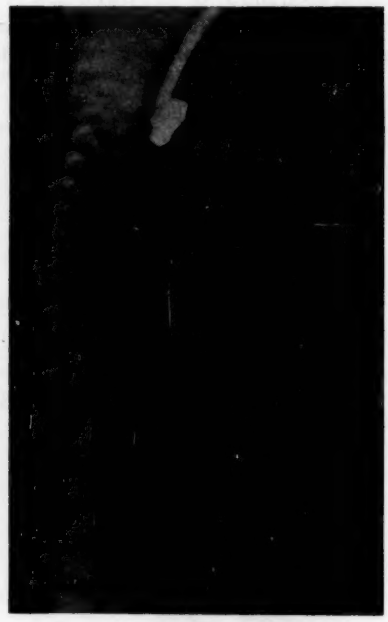

FIG. 2-b

FIG. 2-a. Schematic drawing of atresia of the esophagus with a tracheo-esophageal fistula to the lower esophageal segment.

FIG. 2-b. A roentgenogram of such a patient has a normal gas pattern in the intestinal tract. Lipiodol in the upper esophageal pouch demonstrates that it ends blindly.

pouch somewhat above the diaphragm (Fig. 1-a). About 3% of the cases are of this type. In the commonest form of the anomaly a tracheo-esophageal fistula is associated with the atresia, and in 94% of the cases communicates with the lower esophageal segment. In these patients, the upper esophagus ends as a blind pouch at the level of the second or third dorsal vertebra (Fig. 2-a). In rare instances a fistula may go to the upper esophageal segment (Fig. 3-a) or there may be a double fistula—one to the upper and one to the lower esophageal segment (Fig. 4-a). A tracheo-esophageal fistula may also

be present without an atresia (Fig. 5-a). These last three types are rare, each occurring in about 1% of the series.

The diagnosis of atresia of the esophagus is not difficult. If a newborn baby has excess saliva, the possibility of this condition is suggested. If the first and subsequent feedings are immediately regurgitated and the vomiting is followed by a bout of cyanosis, the diagnosis of atresia of the esophagus should be suspected. The presence of an atresia can easily be proved by inserting a No. 8 soft rubber catheter into the esophagus and demonstrating an obstruction in the upper third of the esophagus. In the rare case of

FIG. 3-a

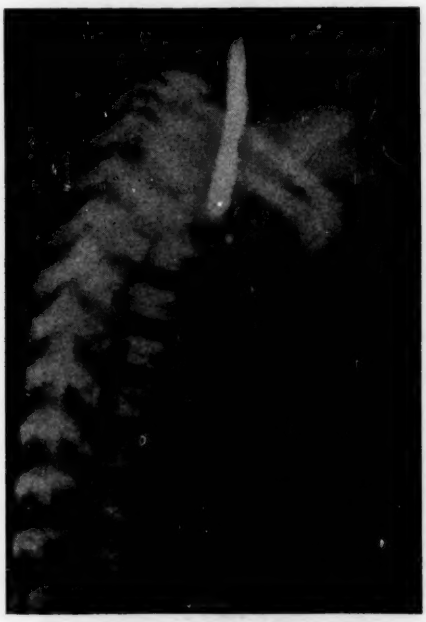

FIG. 3-b

FIG. 3-a. Schematic drawing of atresia of esophagus in which the tracheo-esophageal fistula communicates with the upper esophageal pouch.

FIG. 3-b. A roentgenogram of such a patient reveals no gas pattern in the abdomen and lipiodol is in the trachea, having passed from the upper esophageal pouch into the trachea by the way of a tracheo-esophageal fistula.

tracheo-esophageal fistula which is not associated with atresia of the esophagus, a catheter will pass into the stomach.

As a first step in determining the type of malformation, 0.5 to 1.0 cc. of lipiodol should be injected slowly through the catheter into the esophagus. This is done with the baby under the fluoroscope, in order to guard against an overflow of lipiodol into the trachea. Barium should not be used as the opaque material, for aspiration of this substance may result in a severe pneumonia. If the roentgenogram demonstrates no gas pattern in the intestine and a blind upper pouch, the atresia is not associated with a tracheo-esophageal fistula (Fig. 1-b). A blind upper pouch with a gas pattern in the intestine

proves that the atresia is associated with a tracheo-esophageal fistula to the lower segment (Fig. 2-b). Should lipiodol enter the trachea and no gas be present in the intestinal tract the tracheo-esophageal fistula is associated with the upper esophageal segment (Fig. 3-b). If lipiodol enters the trachea and there is a normal intestinal pattern, there is a double fistula—one to the upper and one to the lower esophageal segment (Fig. 4-b). A roentgenogram may outline a normal esophagus and lipiodol in the trachea and thus proves a tracheo-esophageal fistula without atresia of the esophagus (Fig. 5-b).

FIG. 4-a

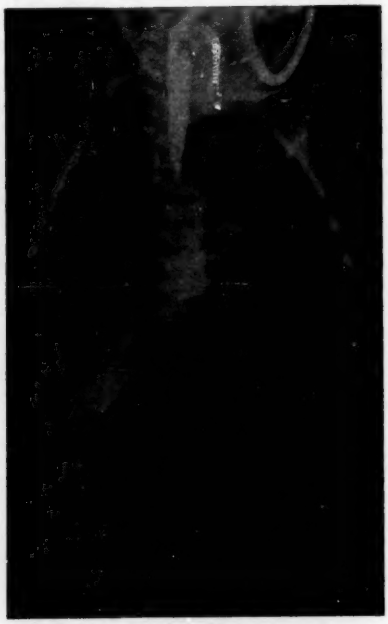

FIG. 4-b

FIG. 4-a. Schematic drawing of atresia of the esophagus with a double tracheo-esophageal fistula, one to the upper end and one to the lower esophageal segments.

FIG. 4-b. A roentgenogram of a patient with such an anomaly has an intestinal gas pattern proving there is a tracheo-esophageal fistula to the lower esophagus. There is also evidence of a second fistula to the upper esophagus as lipiodol has entered the trachea from the upper esophageal pouch.

In the preoperative examination associated anomalies should be sought for, as they are fairly common. In a series of 113 cases at the Children's Hospital in Boston, 80 malformations of various kinds were found, many of these being multiple in a single patient. Fortunately, most of these are of minor consequence. In the author's series of 32 infants, there were two instances of congenital heart disease, four of imperforate anus, and one of atresia of the terminal ileum. Recognition of the associated anomaly was important in the care of some of these patients.

Next in importance to an early diagnosis is the preoperative care of these infants. The

baby should be placed in an oxygen tent, and gentle suction applied to the nasal catheter which has been inserted in the upper esophageal pouch (Fig. 6). (Catheter is a size 10 or 12 French depending on the size of the baby. Two extra holes are cut in the catheter so that there is an efficient removal of material from the upper esophageal pouch). This keeps the esophagus empty and prevents further aspiration of saliva during the preoperative preparation. As the infants are usually dehydrated, 5% dextrose in water is given intravenously. One and one-half grains of sulfadiazine per pound of body weight are given each 24 hours in eight doses. 20,000 units of penicillin are given every three hours. A few hours after admission, a red blood count is done and if it is over 4.5

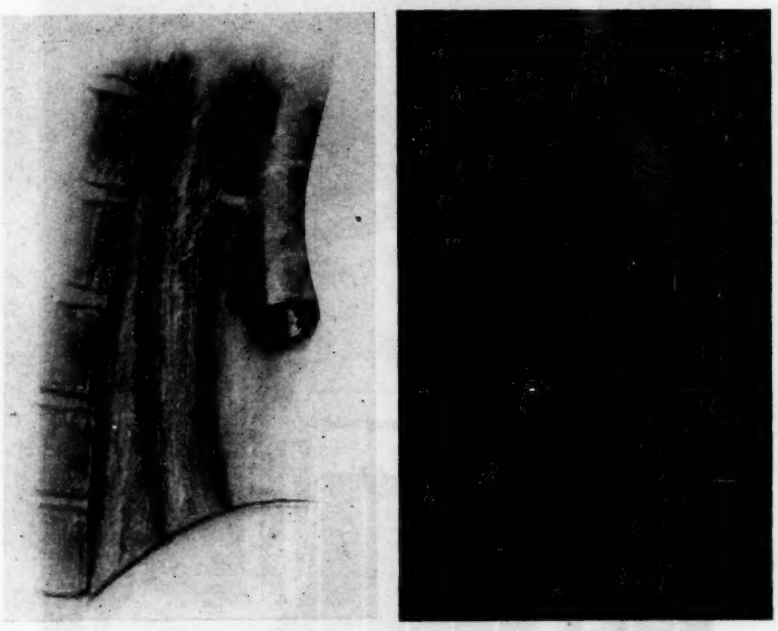

FIG. 5-a. Schematic drawing of a tracheo-esophageal fistula which is not associated with atresia of the esophagus.

FIG. 5-b. A roentgenogram of such a patient demonstrates a normal esophagus with a tracheo-esophageal fistula outlined with lipiodol.

million, plasma is given; or if it is below this level a transfusion is administered. The total amount of fluid given through a vein at one time is calculated on the basis of 10 cc. per pound of body weight. One or two such intravenous injections are given preoperatively.

In 24 hours or less there is usually considerable improvement in the patient's general condition. The temperature approaches normal, and the respiratory and pulse rates become slower. Delay of operation beyond 24 to 36 hours is usually of no avail, as the danger of further aspiration pneumonia more than outweighs a possible gain.

Cyclopropane is the anesthetic of choice for operations on these babies, and is administered with a tight fitting face mask. On rare occasions when trouble developed with the airway an intratracheal tube was used. In comparison to local novocain infiltration, cyclopropane has the advantages of shortening the procedure and of saving the baby a great deal of energy.

Preoperative sedation, particularly morphine, may lead to serious periods of apnea during cyclopropane anesthesia and therefore should not be used in these cases. It is

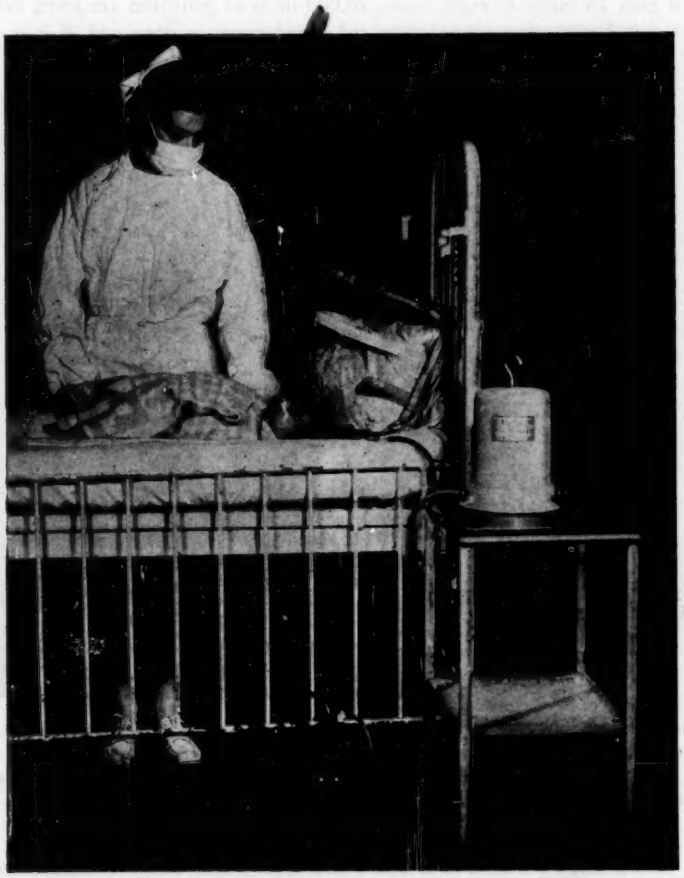

FIG. 6. Photograph of a baby with atresia of the esophagus being prepared for operation. A catheter which extends through a nostril into the upper esophagus is on gentle suction to prevent aspiration of material that is swallowed. Oxygen is ready to be administered.

desirable to give atropine preoperatively, 0.06 mg. being given subcutaneously.

A constant intravenous needle should be in place before the operation begins, and during the procedure blood should be given slowly to keep the infant in good condition.

As experience has grown with these cases, it has become possible to perform an increasing proportion of end-to-end anastomoses of the esophagus. The alternative procedure is to divide the tracheo-esophageal fistula, bring the upper esophagus out to the neck, and perform a gastrostomy. This commits the child to the long hospitalization and multiple procedures required to make an extra-thoracic esophagus. Of the last 28 patients operated on by the author, only one multiple-stage procedure was performed.

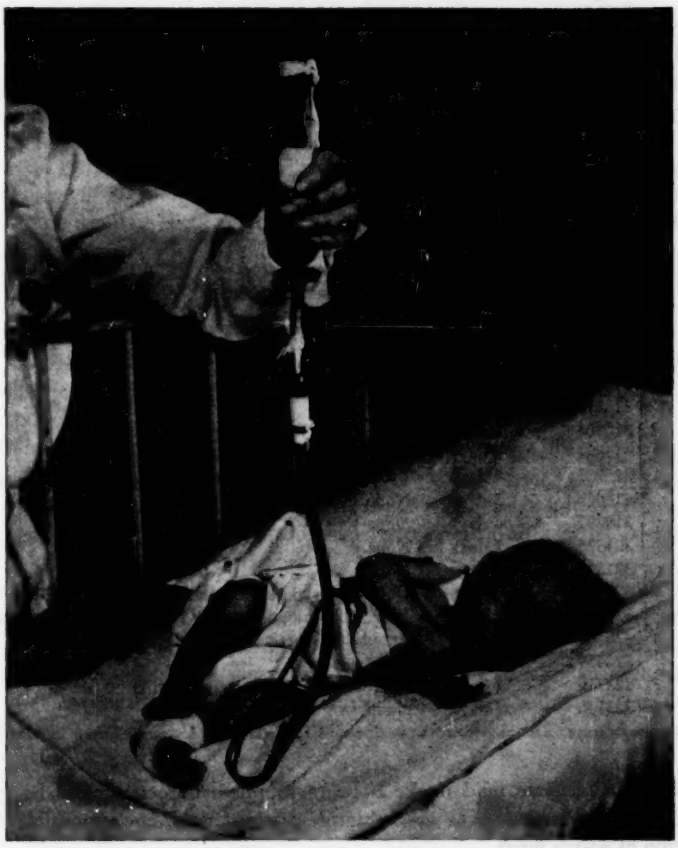

FIG. 7. The formula is run in slowly through the gastrostomy with the use of a Murphy drip.

Precise postoperative care of these patients is of the utmost importance. The infants all have a certain amount of pneumonia, which usually can be fairly well controlled by chemotherapy. Generalized edema is a common and serious postoperative complication which is of the greatest concern to the surgeon. The healing of the chest wound and—more important—of the anastomosis of the esophagus is delayed in the presence of edema. To help forestall this complication, precaution must be taken against giving excess fluids to these infants. As long as a baby voids from four to five times in a 24-

TABLE I
SUMMARY OF CASES OF PRIMARY ANASTOMOSES

Case	Record Number	Age	Postoperative Complications
1	296099	9 days	Died of pneumonia 24 hours after operation
2	297981	4 days	None
3	298835	3 days	Pneumonia
4	304529	5 days	None
5	304447	3 days	Pneumonia
6	304556	2 days	Esophagus has been dilated 3 times
7	306133	2 days	None
8	307687	2 days	None
9	307993	5 days	Severe diarrhea
10	308779	2 days	Pneumonia cardiac failure
11	309512	3 days	None
12	309536	5 days	None
13	311225	3 days	None
14	311426	1 day	Two weeks postoperatively fistula developed through wound. Closed in 7 days.
15	312406	3 days	None
16	312442	2 days	Died in 48 hours. Pneumonia.
17	312447	2 days	None
18	315641	3 days	Bronchopneumonia. Died on 5th postoperative day.
19	315816	1 day	None
20	315868	4 days	None
21	315881	3 days	None
22	315987	4 days	Bronchopneumonia. Died on 3rd postoperative day.
23	316035	5 days	None
24	319297	4 days	None
25	321325	7 days	None
26	321529	3 days	None
27	321523	3 days	Developed stricture at anastomosis
28	322105	2 weeks	Died 14 hours postoperatively. Multiple lung abscesses.
29	323365	3 days	Anoplasty for recto-vaginal fistula
30	323459	5 days	None
31	323719	2 days	Anoplasty for recto-vaginal fistula
32	323740	7 days	None

hour period, an adequate fluid intake is being supplied. Care must also be exercised against the administration of excess chlorides, which may be responsible for the accumulation of edema fluids.

Another factor contributing to postoperative edema is failure to supply an adequate protein intake. These babies are in need of protein because: (1) the infection which they all have in some degree causes a loss in their protein reserve, (2) it is well known that the process of healing after an extensive operative procedure requires large amounts of protein, and (3) these babies are on a starvation regimen before and for a time after operation. Accordingly, every effort must be directed toward a high protein and caloric intake in the early postoperative period.

Twenty-four hours after mediastinal exploration a gastrostomy should be performed under cyclopropane anesthesia. Eight hours after completion of the gastrostomy, fluids

are given through the tube. In 24 hours a dilute formula is given through the gastrostomy, and in 48 hours a full strength formula is supplied.

Until adequate gastrostomy feedings are possible, blood or plasma should be given each day. If edema is marked, concentrated human albumin has been given in amounts from 5 to 8 cc. intravenous daily.

The babies should be weighed daily to determine the amount of edema that may be developing.

The rate of administration of intravenous fluids should not exceed 2 cc. per min. It is a great temptation to pump them in rapidly, but it must be remembered that the rate of injection a normal infant will tolerate is no criterion in the treatment of these babies, particularly those with edema and pulmonary infection. Rapid injection might initiate overwhelming pulmonary edema.

The rate of giving the gastrostomy feedings is also important. It is our practice to drip them, allowing 30 to 45 minutes for each feeding (Fig. 7), to eliminate the great hazard of vomiting. The esophageal suture line could easily be disrupted by forceful vomiting and further aspiration could take place.

The patients should be started on small amounts of fluid by mouth on the tenth postoperative day if there are no complications. Usually, in four to five days thereafter all of the formula can be taken orally. Most of these cases are discharged on about the sixteenth postoperative day. Only two cases in this series have been dilated. None of the remaining patients have had trouble swallowing. It is best to delay solid foods until the sixth month.

Table I shows the series of 32 primary anastomoses, in which there were five postoperative deaths. This low mortality rate is due to the following factors: (1) earlier diagnosis—in consequence of which the babies are sent into the hospital before an overwhelming pneumonia develops; (2) improved preoperative as well as postoperative care; and (3) changes in operative technic.

Two recoveries have been made from the group of five multiple-stage procedures in the author's series. In one of these cases the extra-thoracic esophagus has been completed. The second child is still faced with the long hospitalization and the difficulties of constructing a new esophagus. It is evident from these facts that primary anastomosis is the treatment of choice for this congenital malformation, whenever possible. Improved technic and experience now make it possible to perform a primary anastomosis in a large majority of cases.

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Spanish Abstract

El crecido numero de intervenciones quirurgicas realizadas con exito en el tratamiento de la atresia esofagica y la fistula esofago-traqueal, ha renovado el interes por el estudio y mejor conocimiento de estas anomalias.

Desde el punto de vista anatomico se consideran cinco variedades:

1. Atresia pura del esofago (excepcional).
2. Atresia asociada con fistula esofago-traqueal alta.
3. Atresia asociada con fistula esofago-traqueal baja.
4. Atresia con doble fistula.
5. Fistula esofago-traqueal sin atresia. (Muy rara, 1%).

El diagnostico se hace principalmente por la regurgitacion de todo liquido tomado por la boca seguido de crisis de cianosis de tipo paroxistico. La obstruccion del esofago se demuestra por la imposibilidad de pasar un cateter blando de goma, hasta el estomago. Comprobacion radiografica.

Los niños deben prepararse antes de la operacion con una adecuada hidratacion y la administracion de quimioterapia. (Sulfadrogas.)

Casi siempre es posible en todos los casos hacer una anastomosis termino-terminal del esofago en estos niños. Posteriormente se les practica una gastrostomia para alimentarlos por ella durante un periodo aproximado de diez dias pasado los cuales se comienza la alimentacion oral.

Los autores presentan una estadistica de 32 casos de anastomosis primaria del esofago con cinco muertes.

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PAROXYSMAL TACHYCARDIA IN INFANTS

Report of Two Cases Treated with Intravenous Acetylcholine Bromide

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Chicago, Ill.

PAROXYSMAL tachycardia is a spectacular disturbance of cardiac rhythm. In children and adults its recognition is usually easy, both because it produces symptoms which focus attention upon the cardiovascular system and because the rapid heart rate is easily detected by auscultation. In infants its presence is less easily determined, as a baby does not describe his symptoms and the heart sounds may be easily obscured by crying or noisy respirations.

That the condition is not a rare one was pointed out by Hubbard[1] in 1941. He reported nine cases, six of which were seen by him in a single year. In the previous literature he was able to find only 19 well established instances of the disease. Since his paper a number of cases have been reported. Hubbard[1] pointed out that methods often found useful in the treatment of adults, such as pressure over the eyeballs, or the carotid sinus, or the use of quinine, quinidine, physostigmine or pilocarpine have usually failed to restore normal rhythm in infants. He found digitalis to be effective in all of his patients. Prior to the first case reported herein, treatment with digitalis had been uniformly successful in the ten such patients encountered at this hospital during the past five years. In this instance, a baby weighing approximately 3.2 kg. (7 pounds) was given 0.375 gm. of digifolin by intramuscular and intravenous routes over a period of 72 hours. At the end of this time, the tachycardia persisted. After discussing the situation with Dr. L. N. Katz and his co-workers in the Cardiovascular Department of Michael Reese Hospital, we attempted to restore normal cardiac rhythm by the intravenous use of acetylcholine bromide according to the methods of earlier investigators, Abbott,[2] and Segers et al.[3] The second case was that of a moribund infant to whom acetylcholine bromide was given because we felt she would expire before digitalis could affect the cardiac rate.

CASE REPORTS

Case 1: B.B., a girl, was brought to The Children's Memorial Hospital on March 11, 1947, at the age of one month, because of vomiting, shaking, and spells of cyanosis. The birth history was uneventful; the baby weighed 3.5 kg. at delivery. At the age of eight days, an attack of cyanosis and shaking occurred which lasted about 20 minutes. Thereafter she seemed well until four days before admission when she began to have daily spells similar to that described, except they now lasted longer and were more severe. The family history was non-contributory. Physical examination upon hospitalization revealed a lethargic, cyanotic infant who was afebrile. Respiratory movements were rapid but not difficult. There were no signs of meningeal irritation. The heart was not enlarged to percussion. Auscultation of the heart revealed a rate greater than 240/min. No murmur was heard. The lung fields were clear. The liver was enlarged almost to the iliac crest. A diagnosis of paroxysmal tachycardia was made and confirmed by electrocardiogram.

The child was placed in an oxygen tent and 50 mg. of digifolin was immediately given by intramuscular injection. A similar dose was given six hours later. Thereafter 25 mg. was given intramuscularly, and later intravenously every six hours until a total of 0.375 gm. of digifolin had been

From the Children's Memorial Hospital, Chicago, Ill.
(Received for publication September 11, 1947.)

administered. There was no change in the rate of the heart. The lung fields remained clear. The liver remained at the iliac crest. Edema of the lower extremities appeared. In the meantime, other symptoms apparently unrelated to the cardiac condition, were observed. The baby became comatose, the extremities were rigid, and finally repeated convulsions occurred. A spinal tap revealed bloody fluid. We believed that the child had suffered a cerebral accident. Nevertheless, we felt that the child would have a greater chance of survival if normal cardiac rhythm could be restored without further delay. During our conversation with members of Dr. Katz's department, mutual agreement

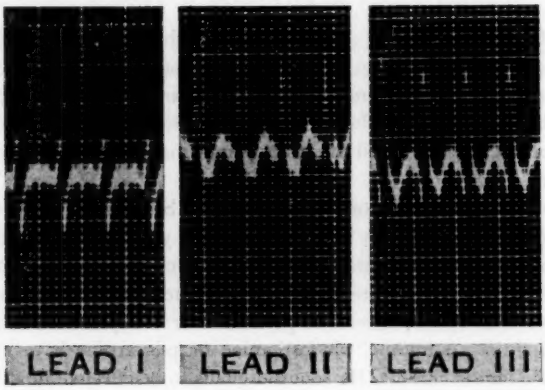

FIG. 1, Case 1: Supraventricular tachycardia (Rate 300/min.) preceding administration of acetylcholine bromide.

had been reached that 5 mg. of acetylcholine bromide would be the proper initial dose for a child of this size. However, our trepidation led us to use an initial dose of only 1.0 mg. This decision was reached because acetylcholine bromide is destroyed, in vivo, with "flash-like suddenness." We felt that it would be safer to administer small, gradually increasing quantities of the drug at short intervals until normal rhythm was restored.

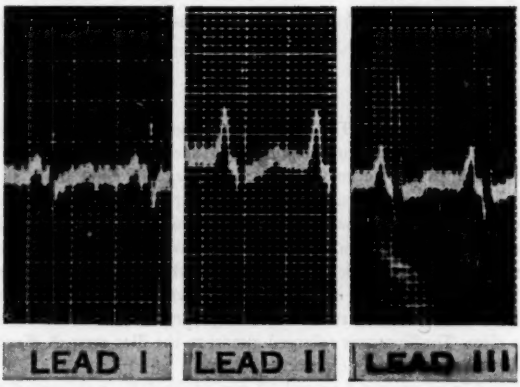

FIG. 2, Case 1: Sinus rhythm (Rate 150/min.) following administration of acetylcholine bromide.

During the period of injection of acetylcholine bromide and for a considerable period thereafter, one observer checked the cardiac rate by auscultation. Meanwhile an electrocardiogram (Lead I) was made. In the course of a few seconds bradycardia replaced the tachycardia and in turn was

followed by sinus rhythm, which persisted until death some 14 hours later. From the time the child's heart rate returned to sinus rhythm until death, she continued having convulsions. The liver receded to the costal margin, and the heart rate was regular at 148/min. Permission for a complete post mortem examination was obtained. Extensive cerebral hemorrhage was found to be the cause of death. The heart appeared normal.

Case 2: P.G., a girl, was brought to The Children's Memorial Hospital on September 18, 1947, at the age of three weeks. She was born at full term. The birth weight was 3.4 kg. She seemed well until three days before admission to the hospital, at which time she cried out suddenly, became pale, and then cyanotic. Vomiting and dyspnea supervened, and the course was rapidly downhill. On arrival at the hospital she appeared moribund. The respirations were gasping, and prostration and cyanosis were extreme. A few coarse rales were heard at the bases of the lungs. The cardiac rate was estimated to be in excess of 300/min. There was no murmur. The liver was very firm and could be palpated three to four finger breadths below the right costal margin. The extremities were limp. A diagnosis of paroxysmal tachycardia was made and confirmed by electrocardiogram (Fig. 3, Lead I).

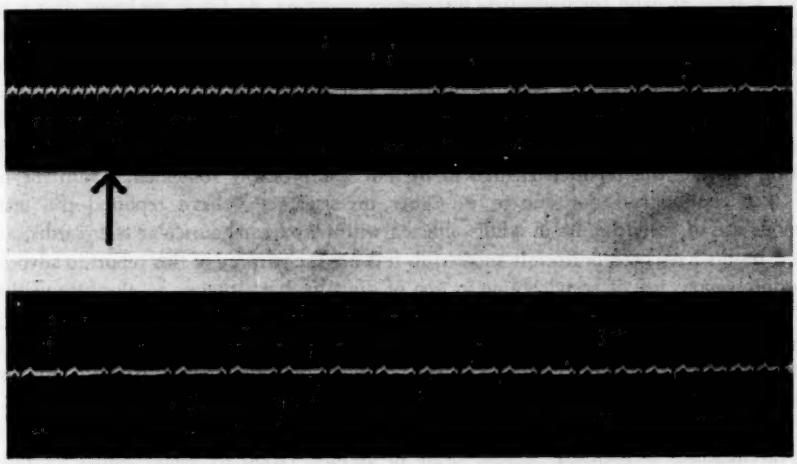

FIG. 3, Case 2: Lead I, continuous record. Conversion of supraventricular tachycardia (Rate 360/min.) to sinus mechanism (Rate 120/min.). Arrow indicates termination of injection of 4 mg. of acetylcholine bromide.

Because of the baby's desperate condition, it was felt that digitalization could not be accomplished before the infant would expire. Therefore, she was treated with intravenous acetylcholine bromide. During the period of injection an observer listened to the heart, while another recorded the electrocardiogram (Lead I). Acetylcholine bromide was administered in progressively increasing quantities of 1.0 mg., 2 mg., and 4 mg. When doses of 1.0 mg. and 2.0 mg. of the drug were given, there was no effect on the cardiac rate, but the respirations became deeper and apparently more difficult during expiration. After 4 mg. of the drug had been given marked bradycardia occurred and was followed by sinus tachycardia. During the period of bradycardia a ventricular premature beat occurred (Fig. 3). As soon as the rapid cardiac rate was converted to sinus mechanism, there was an immediate improvement in the child's color, and respirations became slower and less difficult. Almost immediately the liver became softer and began to decrease in size.

The following morning the child's color was good. The heart rate was regular at 150/min. No murmur was audible. The lung fields were clear. The liver was palpable only one-half inch below the costal margin. Thereafter the child appeared in excellent condition. Three and one-half days after admission she was discharged.

Discussion

The conversion of supraventricular paroxysmal tachycardia to normal rhythm by acetylcholine bromide illustrates the use of a dramatic pharmacologic weapon in pediatric therapeutics. It has been shown by Noth et al.[4] and by Goldenberg et al.[5] that various cardiac and electrocardiographic changes can be produced in experimental animals by the intravenous use of this drug. These changes include partial or complete heart block, and ventricular standstill of varying duration. In addition, the drug causes slight depression of the sino-auricular node, and more marked depression of the auricular musculature, the A-V node, and the bundle of His. These actions, along with a vagal braking action, are favorable for abolishing paroxysmal supraventricular tachycardia.

When administering this drug it should be foremost in mind that it is a powerful "parasympathomimetic" and must be used with extreme caution. Intravenous acetylcholine bromide should not be given without an appropriate dose of the antidote, atropine sulfate, at hand for immediate intravenous injection. As far as we know, this is the first time that acetylcholine bromide has been administered intravenously in infants for the treatment of paroxysmal tachycardia. Previously the subcutaneous use of this drug in the same condition had been reported by von Kiss[6, 7]; in this instance, the cardiac rhythm did not return to sinus mechanism for 25 minutes following the injection of acetylcholine. Since all of the body tissues and fluids contain choline esterase,[8] a rapidly acting enzyme, the reported change in rhythm was probably coincidental with the use of acetylcholine and not due to it. Other investigators[2, 3] have reported the intravenous use of acetylcholine in adults afflicted with paroxysmal auricular tachycardia, and their results have been uniformly successful. It is not the purpose of this report to advocate the intravenous use of acetylcholine in lieu of digitalis, but rather as an alternate method of therapy should digitalis fail to convert paroxysmal supraventricular tachycardia to sinus rhythm within a reasonable period of time. A second indication for the use of intravenous acetylcholine bromide is in the treatment of desperately ill patients requiring immediate relief.

The electrocardiograms presented in the accompanying figures illustrate (1) Case 1: supraventricular tachycardia present prior to administration of acetylcholine bromide; (2) Case 1: the almost immediate return of sinus mechanism following the intravenous administration of 1.0 mg. acetylcholine bromide. The electrocardiogram recording the change from paroxysmal tachycardia to bradycardia, and then to sinus rhythm, is omitted in this instance because of artefacts caused by muscular activity during and immediately following the injection of acetylcholine bromide; (3) Case 2: illustrates the supraventricular tachycardia, and the period of bradycardia immediately following the injection of acetylcholine bromide. Prior to the resumption of sinus tachycardia, a ventricular premature beat is seen.

Summary

Two cases of supraventricular paroxysmal tachycardia in infants are presented. In each instance the abnormal cardiac rate was converted to sinus mechanism by the intravenous administration of acetylcholine bromide. One child died from cerebral hemorrhage; the other child survived.

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707 Fullerton Ave.

THE PASSAGE OF A FOREIGN BODY (FOXTAIL) THROUGH THE BRONCHUS, LUNG, PLEURA, AND THORACIC WALL

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ONLY a few of the foreign bodies which children place in their mouths have resulting serious consequences. Many of these are swallowed and most of them pass through the gastro-intestinal tract without difficulty. A smaller number are aspirated; some of these are coughed up and the others help to make up the collection of every good bronchoscopist. Only when the foreign body is sharply pointed and barbed in such a way as to have almost the property of self propulsion can the following sequence of events transpire.

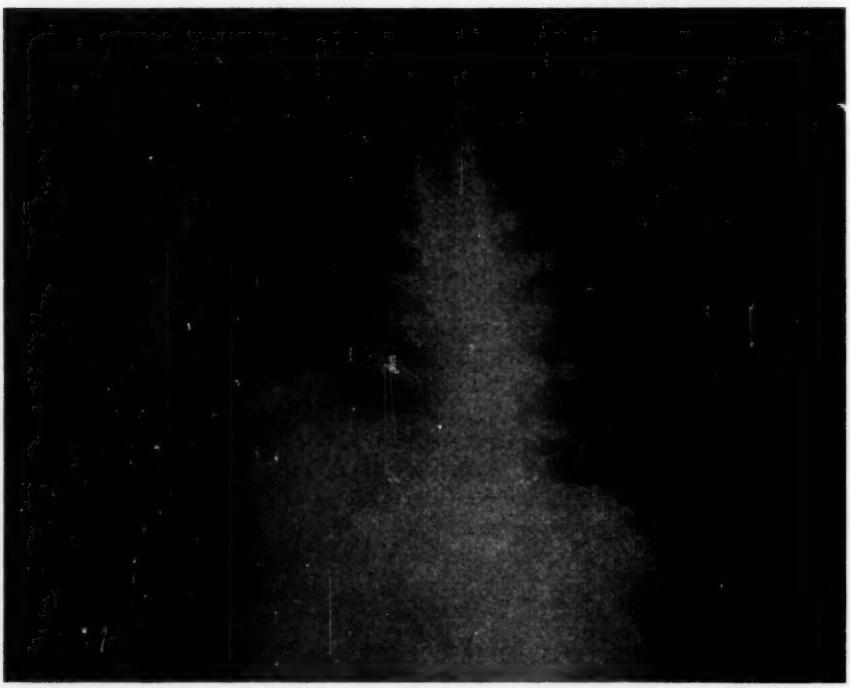

FIG. 1. Chest film at time of hospital admission.

From the Department of Pediatrics, University of California Medical School and the Children's Hospital, San Francisco.

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Case Report

The patient, A.S., was a four-year-old boy who was first seen April 21, 1945 with the complaint of abdominal pain and fever of 24 hours' duration. His mother stated that on April 17, four days previously, he said that he had swallowed some grass which she believed that he had passed in his stools. To this she ascribed the abdominal pain. She denied that he had done any coughing and expressed surprise, on this account, at the diagnosis of pneumonia which was promptly established.

The child appeared distinctly pneumonic; the temperature was 40°C, he was flushed but not excessively ill looking. The respirations were grunting and rapid. Significant physical findings were limited to the chest. Both sides of the chest were moving equally and well with respiration. The percussion note was resonant throughout but over the right base posteriorly the breath sounds were harsh. No rales were heard. Abdominal examination showed no localized tenderness, masses, or other abnormal findings.

A diagnosis of right lower lobe pneumonia was made and he was given an initial dose of 1.0 gm. of sulfathiazole followed by 0.5 gm. every four hours. During the next three days he showed consistent improvement. There was no complaint of pain, coughing was minimal, there was never any hemoptysis, and the boy improved so well that his mother was reluctant to

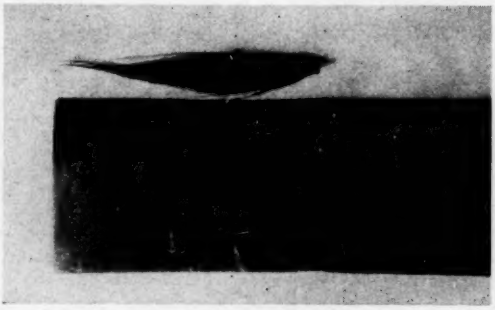

Fig. 2. Foxtail after removal.

continue medication. Examination of the chest, however, continued to reveal definite signs of pneumonia with definite dullness at the right base posteriorly and with diminished high-pitched breath sounds over the dull area. The temperature rose daily to 38.5°C. He was continued on 0.5 gm. of sulfathiazole five time daily.

April 27, six days after first examination, his temperature abruptly rose at midnight to 41.3°C., and he was distinctly more ill and prostrated. The right side of his chest was then moving poorly, the percussion note at the right base posteriorly was dull, and the breath sounds over the dull area were practically inaudible.

At this time the mother insisted on a somewhat different story of onset than previously. By contrast with the previous history, she now said that the child had coughed violently at the time he ingested the grass although manifestly he had done very little coughing since our first observation.

The patient was immediately admitted to Children's Hospital to investigate the possibilities that his pneumonia was simply failing to respond to sulfonamides, that he had a complicating empyema, or that an intra-thoracic foreign body might be primarily responsible for the symptoms.

On entry he was placed upon 30,000 units of penicillin every three hours intramuscularly. An X-ray (Fig. 1) showed right lower lober pneumonia without significant displacement of the heart and of the mediastinum; and there was no narrowing of the rib interspaces. There was no fluid and nothing to suggest atelectasis as the basis for pneumonia. His temperature promptly dropped to normal and remained there during his hospital stay. He was active, ate well, and coughed very little. The whole picture was entirely consistent with pneumonia which was responding adequately to penicillin therapy.

May 1, four days after admission to the hospital and ten days after he was first seen, a firm,

slightly tender mass was observed in the right mid-axillary line in the sixth intercostal space. This enlarged rapidly to be about 3 × 3 cm. in diameter and became red and fluctuant.

May 4 an 18 gauge needle attached to a hypodermic syringe was introduced into the fluctuant area. After 3 cc. of thick pus was aspirated the needle became blocked, and as it was slowly withdrawn a large foxtail followed the needle outward with almost the celerity of a living thing. The needle opening was enlarged with a scalpel and the wound debrided of foreign material of

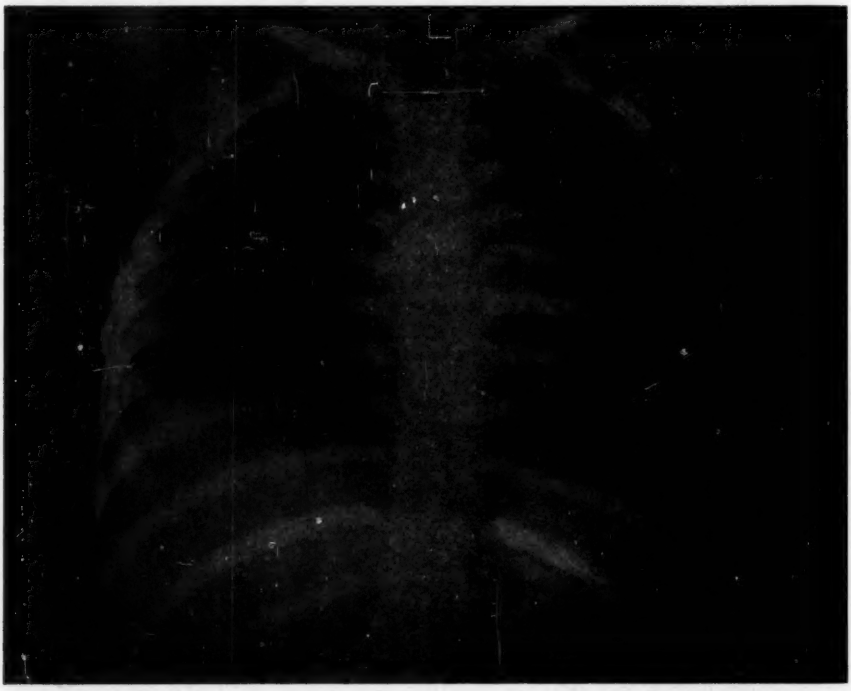

FIG. 3. Chest film 3 days after removal of foxtail.

which there was little present. The foxtail (Fig. 2) measured 5 cm. in length. Cultures of the pus showed a growth of H. staphylococci and gram negative bacilli.

The subsequent course proceeded to rapid and complete recovery. The wound healed quickly, leaving no evidence of a fistulous tract. Signs of pneumonia quickly disappeared. X-rays on May 7 (Fig. 3) showed minimal residual changes in the lung. The boy was observed at intervals during the next six months without evidence of any abnormality.

DISCUSSION

This case is reported because it is unique in our experience and is, according to the literature, an extremely unusual occurrence. Only a few similar foreign bodies have been reported. Seydell[1] reported a similar case in 1937 and found only eight such cases reported from 1879 to 1937. We have been unable to find any identical cases since 1937. There is a remarkable similarity in these reported cases: in each the foreign body had the power of self propulsion, and in each it passed through the right bronchus to appear in the subcutaneous tissue between the ribs. The shortest lapse of time between

aspiration of the foreign body and its appearance under the skin was eight days and the longest was one year.

Earlier diagnosis might easily have led to bronchoscopy and radical therapy which could hardly have been as conducive to rapid and complete healing as was here encountered. By the time that symptoms pointed to the possibility of the aspiration of a foreign body the child had extensive pneumonia and his general condition made it impossible to subject him to bronchoscopy. By this time, furthermore, the foxtail, which could not be visualized directly by X-ray, must already have penetrated far beyond a position accessible to bronchoscopy; so that perforation of the chest wall and removal externally was simply a fortunate solution of what might have been a very difficult problem of therapy.

Summary

The case is presented of a four-year-old boy who ingested a foxtail 5 cm. long. Within 24 hours this produced evidences of right lower lobe pneumonia, the fever responded to sulfathiazole and to penicillin, and the foxtail was removed 14 days after ingestion from a subcutaneous abscess located in the mid-axillary line in the sixth intercostal space. There was rapid regression of the pneumonic signs and evidences of pleural effusion or exudation were lacking. The child recovered without any persistent evidences of intrathoracic damage.

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Spanish Abstract

Pasaje de cuerpo extraño a traves de los bronquios, pulmon, pleure y pared toracita

Uno niño de cuatro años fue visto con fiebre y dolor abdominal durante 24 horas de duracion, comprobandosele signos de pneumonia de lobulo inferior derecho. Cuatro dias antes habia tragado algunas jerbas, al principio la madre declaro que esto no le habia provocado tos, sin embargo despues insistio en que en efecto habia tenido inmediatamente un acceso paroxistico de tos.

Que el niño respondio rapidamente al tratamiento por sulfatizol pero durante la continuacion de este tratamiento su temperatura subio at 41.3° y en ese momento fue admitido en el Hospital para someterlo a un tratamiento con penicilina. A su entrada en el Hospital el examen a los Rayos X mostro solamente signos de neumonia del lobulo inferior derecho sin evidencia de atelectasia o derrame pleural. Su temperatura rapidamente cayo a la normal, pero 10 dias despues de la primera ingestion de hierbas aparecio una tumefaccion fluctuante en el lado derecho, en la linea media axilar a nivel del sexto espacio intercostal. Una aspiracion de la tumefaccion retiro tres cc. de pus y un fox tail de 5 cc. de largo. Todos los signos de la inflamacion desaparecieron rapidamente y el examen radiologico del torax volvio a ser enteramente normal.

El caso se reporta por su extrema rareza. Un caso similar fue reportado por Seydell en 1937, quien encontro 8 casos similares reportados desde 1879 a 1937. Desde entonces ningun caso similar habia sido señalado en la literatura. No fue necesario la broncoscopia, por la expontanea propulsion del cuerpo extraño, constituyendose en un verdadero abceso subcutaneo.

384 Post St.

SOME PEDIATRICIANS' VIEWS CONCERNING PROBLEMS OF HANDICAPPED CHILDREN

By WILLIAM MCPEAK, *Study Director, Association for the Aid of Crippled Children*

New York, N.Y.

MANY obstacles must be overcome before the health agencies and professions can successfully rehabilitate handicapped persons or adequately protect others from similar disablement, according to outstanding American pediatricians.

A survey* of pediatricians' attitudes toward physical and mental crippling, recently completed by the Association for the Aid of Crippled Children, New York City, revealed a universal awareness that many important needs of the handicapped are still unmet and a determination that greater, more imaginative efforts must be made to meet them.

The biggest obstacle to full relief for the handicapped, as viewed by many survey respondents, is the lack of basic scientific knowledge concerning the cause of their diseases. Another obstacle of comparable seriousness is the lagging dissemination, among practicing physicians and other health workers who treat the handicapped, of the scientific knowledge which does exist and of the latest developments in techniques.

Although pediatricians realize that serious shortages exist in health facilities, personnel and other resources for direct care and treatment of handicapped individuals, they show relatively greater concern over deficiencies in the relevant knowledge and ineffectiveness of the technics now available. One reason for this view lies in the feeling that some diseases—for example, cerebral palsy—can never be treated with full success, once they exist; and that the necessary alternative is to prevent onset by further study of their causes. Another reason lies in the prevalent expectation that within the next few years there will be a broadscale expansion of government health services. Such services, most pediatricians believe, will consist largely of facilities and resources for care and treatment of the handicapped; but will leave the responsibility for research, demonstration and education largely to the science laboratories, health professions and voluntary health agencies.

Other main findings of the survey disclosed the following general beliefs:

(1) Among handicapped children the problems which require the most attention at present are rheumatic fever, cerebral palsy and related disorders, mental conditions and emotional disturbances, and epilepsy.

(2) With the exception of cerebral palsy, the visible and orthopedic conditions such as poliomyelitis are receiving relatively more attention than the invisible and non-orthopedic disorders such as heart disease.

(3) Voluntary health agencies must accept with medical schools and other institutions

* The survey was conducted by sending letters and questionnaires to the professors in pediatric departments of all American medical schools and to one or more practicing pediatricians in each state. The latter group consisted of all regional and state chairmen of the American Academy of Pediatrics. Since these groups constitute select samples, and since not all persons returned the questionnaire, the opinions expressed in this paper do not necessarily represent accurately the opinions of all pediatricians. They do, however, reflect the considered views of two of the most outstanding and interested groups of authorities on problems of handicapped children.

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the responsibility for advancing and spreading scientific knowledge through research, education and demonstration.

(4) Voluntary health agencies which operate on endowed funds should restrict their operations principally to basic research or to experimental and education programs.

(5) On the assumption that tax supported health activities will continue to expand, the future role of voluntary health agencies will lie more and more in the field of prevention and less in treatment of handicaps.

Professors in pediatric departments are relatively more concerned about needs for research and education in handicapping diseases, while practitioners seem more impressed by shortages of facilities for direct care of individuals.

Relative Importance of Handicapping Diseases

The survey's first question was: "Considering visible as well as invisible handicaps in children, which diagnostic or ailment groups do you think have the greatest unmet needs at the present time?" The most frequent answer was rheumatic fever, which was given by 60% of all pediatricians who responded in terms of classifiable disease groups.

Cerebral palsy and related disorders, including brain injuries, received the second greatest emphasis, being mentioned by 42% of the respondents.

The third most frequently mentioned set of needs was for children with mental problems. The needs of those with psychiatric and adjustment problems and emotional disturbances, excluding mental defectiveness and epilepsy, were emphasized by 30% of the respondents. Some remarked about differentiated psychologic problems of crippled children, but most references were to those children not otherwise handicapped.

Epilepsy was considered next most important, being mentioned by 20% of the responding pediatricians.

Since most respondents referred to the needs of more than one group there was a total of 138 mentions among the 55 pediatricians. The preponderant majority of these were concerned with non-orthopedic handicapping. With the exception of cerebral palsy only nine mentions were made of poliomyelitis, postural defects, rickets and other orthopedic crippling and congenital malformations, signifying that pediatricians believe orthopedic conditions are receiving relatively more attention than others. The same explanation doubtless accounts for the fact that the needs of the deaf and the blind received only ten of the 138 mentions. No other type of handicapping received notable mention.

Most Important "Next Steps" in Heart Disease and Rheumatic Fever

When asked what they regarded as the most important "next steps" which should be taken in the problem of rheumatic fever, 46 of the 55 pediatricians made specific recommendations, the largest group of which concerned need for etiological research with a view toward more accurate diagnosis and more effective treatment. Recommendations for such basic research were made by 21 teachers and 9 practitioners. Fifteen teachers and 11 practioners stated the need for facilities for the diagnosis, treatment and care of patients. Included among those needs of patients were expansions of educational, hospital and convalescent home facilities.

The statement, "rheumatic heart disease is so outstanding I think nothing else should be considered," sounds like an extreme belief of a professor of pediatrics at one of the country's foremost medical schools; but it is shared by a large proportion of other

teachers and practitioners. This professor went on to say that not only some but all needs of this group are unmet. He outlined a four-point action program which he thinks should be initiated:

(1) *Education of public and profession.* The public must be educated to the fact that rheumatic fever and its resultant heart disease are serious illnesses. It is not properly understood that when the acute phase of rheumatism is passed the patient still requires supervision and rest. As a result many patients with rheumatic fever develop irreparable heart damage that could have been avoided. The end results of improper care should be brought to public attention, and, to some extent, to the professional attention of general practitioners. A well thought-out program of lay and professional education is the answer. (Among the 46 respondents who made recommendations in this field, 13 specifically mentioned the need for further professional education, and 7 mentioned the need for the education of the public.)

(2) *Additional facilities for hospital care* of patients with acute rheumatic fever or resultant acute heart damage. For lack of such facilities too many patients are cared for inadequately in their own homes. (26 of the 46 doctors who made recommendations stated the need of facilities for direct services to individuals in hospitals, in convalescent institutions, in schools and in the home.)

(3) *More convalescent homes.* Of all the needs, this is the greatest at present. Patients inadequately cared for at home result in too many hospital readmissions.

(4) *Research programs.* This needs little explanation. Only by concentrated research will the rheumatic fever problem be solved. (Thirty of the 46 respondents who voiced recommendations in this area expressed similar need for research.)

Viewing their role as that of the traditional pathfinder, the above-quoted respondent thinks that voluntary health agencies have an opportunity and a responsibility to carry out the program he outlines. "The most beneficial next step," he continues, "is to set up a demonstration unit in a suitable teaching institution. This should be of sufficient size. The error would come in attempting to do it by half-way measures. The reason such a demonstration unit is needed lies in the inevitable advent of governmental care. When the government undertakes such a program it will be on a nation-wide basis. Many clinics will be set up simultaneously. At the present time no one can say how these clinics should be organized. Unless the problem is investigated by a pilot unit such as is described here, much money will be wasted by attempting to do on a large scale something which has not yet been perfected in a small way."

Although the above views represent the majority of those held by other respondents, it is necessary to quote the reservations of a few others to the effect that "public opinion should not be stirred up too much before we have effective knowledge. The public is now so rheumatic fever conscious we have to defend ourselves against, not urge, its diagnosis."

The pediatric consensus, however, tended to rank rheumatic fever as the foremost cause of child handicapping.

Most Important "Next Steps" in Cerebral Palsy

Even more than in the case of rheumatic fever, pediatrics professors show a greater tendency than practitioners to view cerebral palsy as a problem in basic research. Of the 20 professors who made specific recommendations for action in this field, 16 mentioned the need for basic study as compared with 10 who mentioned the need for facilities used

in direct service to individuals. Among the practitioners, on the other hand, there were 12 mentions of need for treatment and care facilities as against 3 mentions for the need of basic research. The general level of interest among pediatricians is almost as high in this problem as in that of rheumatic fever, however. Of the 55 pediatricians sampled, 37 wrote specific recommendations of some sort.

"Prevention is the paramount issue in all handicap problems," said the pediatrics professor at one of the large Pacific Coast medical schools, "and in the field of cerebral palsy and related disorders of mind and body, which are to so large an extent irreversible, prevention is the only approach from which important benefits are to be expected."

This need for attacking the problem of cerebral palsy at its source was expressed by more than half of those who made recommendations on the subject. One professor said, "Although a great deal can be contributed to the happiness of the victims of cerebral palsy by psycho-therapy and a little can be contributed by physiotherapy, it is relatively futile and very expensive compared with efforts at prevention." Prevention, according to this authority, can best be advanced through correction of what he considers a defective basic medical education, through a more adequate preparation of young doctors for research, and through offering greater inducements to young doctors to stay in research instead of resorting to medical practice simply as a livelihood.

A similar basic approach was recommended by several practitioners. One said, "Even with the advanced equipment available in larger cities, technics leave much to be desired. Answers are not always clear cut. The care of the cerebral palsied by public institutions is woefully inadequate, and diagnosis, care and treatment are pauperizing even to moderately well-to-do families. Basic research and the establishment of schools and institutions for care are urgent needs."

Second only to the emphasis on research in cerebral palsy was the stress on need for professional training, which was voiced by both professors and practitioners. One of the latter said, "Before building more institutions or outlining further programs for care, the necessarily lengthy training of all types of personnel should be started."

In addition to arguments for basic study and training, 22 of the 37 pediatricians who made recommendations in the field of cerebral palsy stressed the need for facilities for the direct care, treatment and education of individual patients. The three-point program outlined by one practitioner was representative of these views: (1) diagnostic clinics should be designated where the patients with cerebral palsy should receive a thorough study by a team composed of a pediatrician, an orthopedist, a neurologist and a psychiatrist; (2) hospitalization should be provided for each patient for a period sufficient to allow all observation necessary to determine the type of treatment required; and (3) treatment centers should be established, preferably attached to hospitals, for physiotherapy and education. Facilities also should be provided to teach parents the factors of this disease.

Most Important "Next Steps" in Mental Hygiene

Although the survey contained no explicit questions on psychiatric problems and emotional disturbances, 15 of the 55 responding pediatricians spontaneously emphasized the need for more and better mental hygiene among children. Several of these respondents made particular mention of the psychosomatic disturbances of the physically handicapped child.

One of the latter group, a pediatrics professor in a New York medical school, thinks

the psychiatric approach may provide the ultimate answer to even such stubborn problems as cerebral palsy. "Clinical studies should be initiated by a child analyst on the psychiatric and psychological aspects of cerebral palsy. I believe that such studies may demonstrate that the fundamental problem in this disease, where normal intelligence exists, is one which awaits the child psychiatrist who can unravel and release the sufferer from his manifold emotional handicaps which stem from his physical handicaps and abnormal emotional environment."

A similar approach to another stubborn problem was recommended by another respondent who said, "Some good studies on the psychologic factors of children's allergies are indicated. I have always had the impression that we usually have to manage chronically asthmatic children by a series of expediencies without ever getting to the fundamental underlying causes."

In psychiatry it is not only research that is needed, according to some pediatricians. Even with what is now known of psychotherapy much could be done by training more personnel and establishing more facilities for direct service. "Wider diagnostic facilities are needed for the large group of emotionally maladjusted children who are not otherwise handicapped," said one respondent. "Earlier diagnosis would be made more often than is at present possible. This requires extension of child guidance clinics and wider facilities for diagnostic services in primary schools." Another pointed out that school authorities should be educated so that they may recognize among their pupils the need for psychotherapy.

The Role of Voluntary Health Agencies

There is much to be done in the field of handicap problems besides basic research, according to the pediatricians, but the restriction of voluntary health agency efforts to the relief of individual patients was recommended by only 4 of the 53 who answered a question on this subject.

The question was asked: "Do you feel that endowed voluntary health agencies should place their greater emphasis upon efforts to advance scientific knowledge or upon efforts to improve application of present scientific knowledge?" Since in reality the alternatives in this question are entangled, a few of the respondents said they would have to recommend emphasis upon both. Among the pediatrics teachers who favored one alternative, 18 emphasized the advancement of basic scientific knowledge as against 8 who recommended an emphasis upon the improvement of its application. The practitioners, on the other hand, favored improvements in application over basic research in the ratio of 14 to 6.

This difference of opinion between professors and practitioners, the largest difference found in the survey data, is significant but also understandable. In a sense each respondent, whether teaching or practicing, says, "I need to know more to do for the handicapped." The practitioner, perhaps partially overestimating the amount of knowledge which exists in medical centers, says, in the words of one, "It is too long before the practical results of research are brought into the daily work of a full time practicing physician. I must be taught *now* what is best to do." The teacher, on the other hand, apparently more confident of his access to the basic knowledge which exists but regarding its sum total as still inadequate, says for example, "What crippled children need is not so much hospitalization, nor application of our present state of learning concerning

those defects which have already been discovered, but rather a genuine improvement in knowledge regarding the conditions and their diagnosis."

Among the 30 respondents who felt that voluntary health agencies should place an emphasis on the improvement of the application of knowledge as against basic research, the majority clearly favored a focus upon demonstration, education and training projects instead of routine direct service to patients. Nineteen of the 30 said the agencies which operated on endowments should restrict their programs to demonstration and educational projects only. Seven said such agencies should support institutions or services which combined both approaches. Only four emphasized direct service to individuals.

Pediatricians disagree on the relationship between research and services for care and treatment. Some say if the needed care is provided research "will follow", that is, that problems will arise in connection with direct service which will provide opportunities for studying underlying causes. Others say that the most basic problems can be formulated now and that successful research demands a systematic approach and diligent work under controlled conditions. For purposes of agency program planning a useful analysis was submitted by a previously quoted pediatrics teacher who feels that the biggest barrier to both good service and good research is found in the inadequacies of current medical education. "I believe that research is at present far more important than any attention to care and treatment with available technics. I feel very strongly, however, that the tendency which we see in the government and philanthropic organizations to separate in our thinking research from education is a bad one. The two are inextricably connected."

The survey showed general agreement among pediatricians, professors and practitioners alike, that future developments in the field of handicap problems will thrust more and more responsibility upon voluntary health agencies for preventive work and less responsibility for direct assistance to individuals.

The survey asked, "Assuming that tax supported health activities will continue to expand, which types of problems or activities do you feel will constitute the largest responsibility of voluntary health agencies after another five or ten years?" In response to this question 19 of the 30 pediatricians who ventured a prediction on the subject agreed in substance with the respondent who said: "To secure the final accurate answer to this question we will probably have to wait and see what the result of the tax-supported health activities will be and what direction public and professional interest will take. Basically, however, I think we can always say that prevention is the largest responsibility." Of the 30 respondents who made predictions on future trends, 11 held that prevention consists not only of basic research but also of demonstration, lay education and professional training.

"As tax-supported health activities continue to expand," said one, "direct service to the sick ought to be provided adequately. Moreover, the investigation of diseases which menace or cause fear will be covered. A voluntary health agency can serve best by acting in a supplementary or pilot capacity, by developing models, whether in the form of investigation or medical care, which will be of aid to the government agencies in the development of their large scale efforts. The selection of projects for private agencies should be opportunistic, that is, the voluntary agency ought at all times to possess the requisite knowledge, judgment and elasticity to be able to seize at short notice on some special enterprise which would serve as a guide to the more ponderous government agencies, coming from behind."

Many of the other practitioners felt also that future developments in government health programs would provide funds for basic research as well as for service to individuals. On the point of direct service some confidently expect that tax-supported health activities will eventually make medical practice available on a pre-paid plan which, as some see it, must eventually be compulsory and not voluntary. Nevertheless, seriously important gaps are expected to be left in such programs for the attention of voluntary health agencies.

SPANISH ABSTRACT

Algunos puntos de vista pediatricos concernientes a los problemas de los niños lisiados

Dos categorias de pediatras, profesores y practicos dieron su opinion en un reciente survey relativo a los problemas de las personas lisiadas. Ambos grupos revelaron que las mayores e importantes necesidades de estos sujetos permanecen aun bajo la determinacion de grandes esfuerzos imaginativos.

El mayor obstaculo para llegar a la recuperacion y auxilio de estos sujetos es el imperfecto conocimiento de su etiologia sobre la que existen serias lagunas acerca de sus conocimientos cientificos. Una tercera necesidad reconocida por los pediatras se refiere a las facilidades personales aunque de menos importancia, porque muchas invalideces son irreversibles y pueden ser resueltas solamente al traves de investigaciones basicas, y expansion de los servicios sanitarios del Gobierno de donde se espera mayores facilidades en la provision de material y mejor divulgacion referente a los conocimientos de educacion cientifica.

Los pediatras estuvieron de acuerdo en los puntoes siguientes:

Entre los niños invalidos los problemas que demandan mayor atencion son: la fiebre reumatica, las paralisis cerebrales, y los desordenes relacionados con ellas; las trastornos mentales y emocionales; y la epilepsia.

La poliomielitis y otras condiciones ortopedicas, con excepcion de la paralisis cerebral han recibido una atencion mucho mayor que los trastornos que tambien determinan invalidez pero que son menos visibles, tales como los desordenes cardiacos.

Que los gastos en el mantenimiento de las autoridades sanitarias deben expandirse ligando las agencias oficiales con los centros voluntarios a fin de abarcar todos los campos de la prevencion favoreciendo la investigacion cientifica y la educacion popular al traves de demostraciones relacionadas con el tratamiento de los niños invalidos.

A la pregunta relativa al diagnostico de estos grupos, el 60% de los pediatras mencionaron en primer termino la fiebre reumatica. Las paralisis cerebrales y los desordenes relacionados con ellas fueron señaladas en el segundo orden. Y el tercer rango lo ocupan los problemas relacionados por los trastornos mentales. Las necesidades de estos, desde el punto de vista de la asistencia psiquiatrica, muy especialmente los trastornos emocionales alcanza un 30% en la investigacion. Muchas referencias fueron hechas en relacion con los niños invalidados psiquicamente. La epilepsia fue considerada como uno de los datos mas importantes en este sentido, siendo señalada por 20% de los pediatras.

En lo relativo a la mayor efectividad en la solucion de los problemas de los niños invalidos, las opiniones difieren de acuerdo con la especialidad pediatrica, las principales diferencias se aprecian entre los profesores y los practicos.

En general se observa que los profesores se inclinan principalmente a las necesidades de investigacion basica y a la educacion en relacion con las enfermedades que determinan invalidez, mientras que los practicos parecen impresionarse mas con la escacez de facilidades en los cuidados directos y en el tratamiento individual de estos niños.

Los practicos tienden a creer que si los cuidados son prodigados individualmente, la investigacion sera subsiguiente y que estos problemas llegaran en conexion directa con los servicios y las oportunidades que representaran el mejor estimulo para esta clase de estudios. Los profesores tienden al punto de vista opuesto, afirmando naturalmente que los problemas basicos mas importante en el estudio y consideracion de los niños invalidos se asientan fundamentalmente en la investigacion cientifica y en el mejor conocimiento de su causa de donde se derivaran los mejores elementos de control y el correspondiente establecimiento de los mejores programas en el tratamiento de estos niños.

580 Fifth Avenue, Room 700

INFANTILE CORTICAL HYPEROSTOSES

By AMOS C. GIPSON, M.D., AND BENJAMIN P. CLARK, M.D.
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A NEW syndrome called Infantile Cortical Hyperostoses was described by Caffey[1] in 1939. It is characterized by tender swellings deep in the soft tissues; cortical thickenings in the skeleton; and onset during the first three months of life. Several bones were involved in each patient but varied in distribution. Hyperostoses were demonstrated roentgenographically in the mandible, clavicles, scapulae, ribs and the tubular bones of the extremities. The swellings were deep and firm. They showed no pitting on pressure and no unusual warmth or discoloration. The swelling of the soft tissues was confined to the areas of the hyperostoses, but these were small hyperostoses visualized roentgenographically in several bones where soft tissue swellings were absent. In all of the skeletal lesions the findings were the same: cortical hyperplasia under a proliferating periosteum.

The findings which were present in some cases but lacking in others, according to Caffey and Silverman[2,3] were: fever, anemia, increased sedimentation rate and pleurisy. Soft tissue swellings appeared in one area while they were disappearing in others. All cases recovered—after several weeks or months—from the fever, tenderness and soft tissue swelling; but the hyperostoses remained unchanged roentgenographically. Complete examination and investigation has not revealed the etiology of these cases.

CASE REPORT

M. S. R., a white female, was seen first at the age of two months with marked swelling and tenderness of the right forearm of one week's duration. Body temperature was normal. X-ray of the right arm at this time revealed a mild periosteal thickening. At 2½ months of age, she had swelling of the mandible in addition to increased swelling of the right forearm. Temperature was 101°, and she was very fretful. At this time the blood count was as follows: white blood cells, 14,600; neutrophils, 38%; lymphocytes, 58%; eosinophils, 4%.

At three months of age, she presented about the same symptoms as on the previous visit and was hospitalized. She was treated with penicillin, sulfadiazine and transfusions. The temperature gradually came down and the swelling subsided some, but this was coincidental and not a result of the treatment. X-ray of the radius and ulna at this time revealed an increase in the cortical thickening since the last picture.

At four months of age there was marked swelling of the right forearm, and increase in the size of the mandible, and swelling and tenderness over both clavicles. An X-ray of all the bones of the body at this time revealed cortical thickening of the radius, ulna, clavicles, mandible, several ribs and one scapula.

The baby now at eight months of age is doing well and has no fever; but she still has some swelling of the right forearm and the mandible.

SUMMARY

The case history is presented of a child with multiple cortical hyperostoses (the eleventh case to be reported), accompanied by fever, low grade leucocytosis and chronic course which falls into Caffey's group of Infantile Cortical Hyperostoses.

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SPANISH ABSTRACT

Hiperostosis cortical infantil

Un nuevo sindrome llamado hiperostosis cortical infantil, fue descrito por Caffey en 1939 y esta caracterizado por hinchazon profunda de los tejidos blandos, espesamiento cortical del esqueleto y aparicion durante los primeros tres meses de la vida.

Este caso desarrollo hinchazon y dolor sobre el antebrazo derecho antes de los dos meses de edad. Despues el mismo sindrome aparece sucesivamente en las mandibulas clavicula, algunas costilla y una escapula.

La hinchazon era profunda y dura. No deja godet a la presion. La hinchazon de los tejidos blandos estaba confinada a las areas de la hiperostosis, pero habia pequeñas hiperostosis dispersadas radiologicamente en varios huesos donde las partes blandas no aparecian inflamadas. En todo el esqueleto las lesiones encontradas son las mismas: hiperplasia cortical, con una proliferacion del periostio. Estos casos se recobran despues de varias semanas de fiebre, dolores e hinchazon de los tejidos blandos, pero las hiperostosis permanecen radiologicamente inalterables.

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THE USE OF PENICILLIN IN OIL AND WAX IN CHILDREN

By CONRAD M. RILEY, M.D., AND PAUL S. STRONG, M.D.
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AN EFFORT has been made to evaluate under controlled conditions the feasibility of using penicillin in a menstruum of oil and beeswax to treat acute infections in children. Answers to two questions were sought primarily in this clinical trial: First, is the danger of serious local reaction sufficient to make its use inadvisable? Second, what dose should be used? In the third place, incidentally, an effort was made to determine whether there was any appreciable difference in the effectiveness of the sodium and potassium salts.

One-hundred six children suffering from acute infectious diseases were given one injection every 24 hours of a preparation of the sodium or potassium salt of penicillin suspended in 4.8% bleached beeswax dissolved in peanut oil,* as described by Romansky and Rittman.[1] Usually the concentration was 300,000 units per cc., but a small amount of material containing 600,000 units per cc. was also used. About one-third of the patients were in the hospital; the rest were out-patients. For the most part (78 patients), they suffered from infections of the upper respiratory tract, usually complicated by otitis media, cervical adenitis, etc. In 45 cases the complicating factor had given rise to frank suppuration. The remaining cases included pneumonitis, cellulitis, one gonorrheal infection of the vagina, and miscellaneous infections. The clinical response in each case reproduced what would have been expected with frequent doses of aqueous solutions of penicillin.

The 106 patients received a total of 510 injections. Most of the children were actually examined at intervals during the two weeks following the initial injection; the few on whom the follow-up was shorter than that were patients living in the vicinity of the hospital who would have been expected to return to the clinic had any severe reaction occurred. In this series there were five known skin reactions at the site of injection and no generalized reaction. The lesions consisted of one or two red raised welts 5 to 8 cm. in diameter, which appeared on the ninth to the twelfth day after the first injection. They did not appear to itch or cause pain, and disappeared in one or two days. There were no abscesses. A history of allergy in the patient or in his immediate family was elicited in 16 cases, but in only two of these did a skin reaction occur.

In order to establish, if possible, a schedule of dosage proportionate to the size of the patient, doses of varying sizes were given and determination was made of the level of penicillin in the blood 24 hours after injection.† The method used was Hobby's, essentially as described by Tompsett.[2] On the basis of *in vitro* work by Meads et al,[3] it was decided to consider a blood penicillin concentration of 0.04 units per cc. a minimum satisfactory level, with a desideratum of 0.1 units per cc. From the work of Cooke and

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* The material was kindly supplied by E. R. Squibb and Sons.

† Appreciation is expressed to Miss L. Goode who carried out all the determinations.

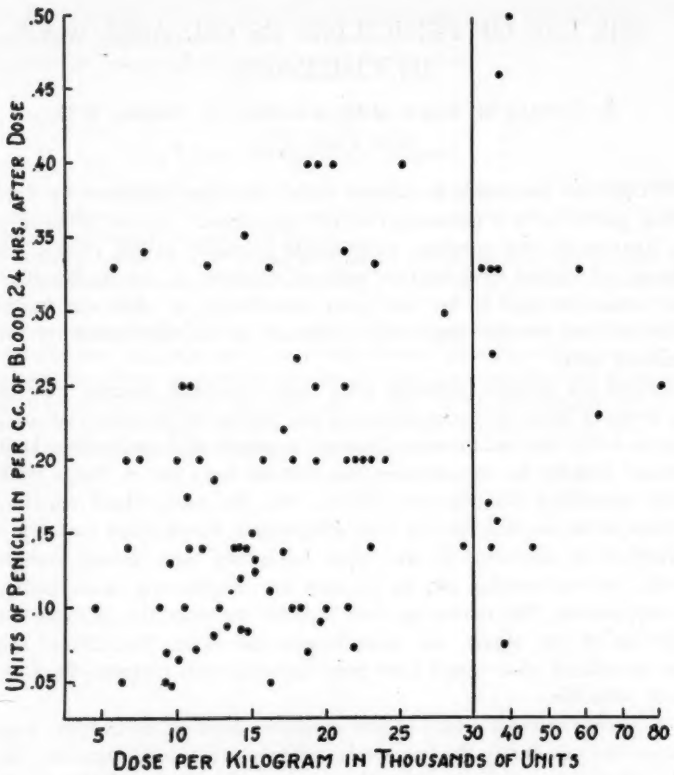

FIG. 1. Chart showing lack of correlation between dose of penicillin in units per kilogram and the blood concentration 24 hours after injection.

Goldring[4] with aqueous penicillin, good correlation between the dose per kilogram and the resulting level was not anticipated.

A total of 83 patients had 257 such determinations. It was noted that in an individual case the 24 hour level remained nearly constant. Therefore, as shown in Figure 1, the average blood level for each patient is plotted against the dose in units of penicillin per kilogram of body weight. From this it can be seen that there is an almost complete lack of correlation between the two. It is interesting to note, however, that none of these average levels is below 0.05 units per cc., although occasional individual levels were lower.

Superficial examination of the data suggested that there might be a better correlation between the absolute dose and the 24 hour level. Statistical comparison from this point of view is shown in Table I. From this it is seen that the 24 hour level resulting from the administration of 300,000 units is significantly higher than that from the lower doses. No significant difference, however, can be demonstrated in the 100,000 and 200,000 unit dose groups. Considering the small size of these groups it is not proper to draw any conclusions. In the 600,000 unit dose group the difference is so great that despite the fact that there were only six cases it seems highly significant.

TABLE I

STATISTICAL COMPARISON OF 24 HOUR BLOOD LEVELS FOLLOWING VARYING TOTAL DOSES

Dose, units Penicillin	No. of Cases	Mean 24 hour level	Sigma	Difference of means	Multiple of sigma of difference
100,000	12	0.112	0.091	0.001	0.03
200,000	13	0.113	0.057		
				0.082	3.73
300,000	52	0.195	0.112		
600,000	6	0.397	0.059	0.202	7.05

It seems fair to conclude that for ordinary infections it is not wise to attempt to adjust the dose of penicillin to the size of the patient; furthermore, a dose of 300,000 units seems to produce an adequate blood concentration at 24 hours.

The comparison of the sodium salt and the potassium salt of penicillin with regard to their ability to maintain an adequate bloodstream level over 24 hours is shown in Table II. Since no potassium penicillin was given in 100,000 unit dosage, the comparisons lie in the other categories. In the 300,000 unit dose groups, where there are fairly large numbers of cases, the difference in the 24 hour level approaches statistical significance, with potassium showing better results by what appears to be a clinically significant amount. In the other groups the differences cannot be considered of even doubtful significance.

TABLE II

STATISTICAL COMPARISON OF 24 HOUR BLOOD LEVELS FOLLOWING ADMINISTRATION OF SODIUM AND POTASSIUM SALTS OF PENICILLIN IN MENSTRUUM OF OIL AND BEESWAX

Dose, units Penicillin	Type	No. of Cases	Mean 24 hour level	Sigma	Difference of Means	Multiple of Sigma of Difference
200,000	Na	6	0.102	0.041	0.021	0.7
	K	7	0.123	0.065		
300,000	Na	30	0.178	0.058	0.072	2.12
	K	22	0.250	0.097		
600,000	Na	3	0.397	0.014	0.035	1.59
	K	3	0.432	0.076		

SUMMARY AND CONCLUSIONS

Penicillin in oil and wax was administered to 106 infants and children in a total of 510 single injections at 24 hour intervals as therapy for acute infections. The clinical response was comparable to that seen with aqueous penicillin administered at more frequent intervals. From this study the following conclusions were reached.

1. The danger of local reaction is not great, as in only five cases there appeared urticarial lesions near the site of injection which seemed to cause no discomfort and which cleared within 48 hours. There were no more serious reactions.

2. There is no satisfactory correlation between the size of dose per unit of body weight and the resulting blood level of penicillin 24 hours after injection. There is, however, a relation between the absolute dose and the resulting blood level. A dose of 300,000 units in all patients regardless of size produced a satisfactory level for the control of ordinary infections.

3. Both sodium and potassium salts were used. There is doubtful statistical evidence that the potassium salt produces higher levels at the end of 24 hours.

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Spanish Abstract

El uso de la penicilina en aceite y cera en los niños

La penicilina suspendida en una mezcla de 4.8% de cera de abeja disuelta en aceite de mani, fue administrada terapeuticamente a 106 niños que sufrian varias infecciones agudas. Un total de 510 inyecciones intramusculares fueron administradas. Solamente en cinco casos se observaron minimas reacciones locales de tipo urticariano fueron de muy corta duracion y no ofrecieron malestar algunos. La respuesta en el tratamiento fue similar a la obtenida con dosis frecuentes de solucion acuosa de penicilina.

Se usaron dosis cada 24 horas y la concentracion de la droga en la sangre fue determinada 24 horas despues de la inyeccion. 83 de los pacientes, tenian 257 determinaciones hechas, pudiendo observarse que no habia una aparente correlacion entre la cantidad de la dosis por unidad de peso del cuerpo y el resultado de la concentracion sanguinea en las 24 horas. Fue ademas evidente que una dosis de 300 mil Unidades de Penicilina inyectada de este modo producia una concentracion sanguinea satisfactoria en las 24 horas (0.5 U.x c.c. o mas) sin importar la talla del paciente. Sales de Sodio y de Potasio de Penicilina fueron usadas (indiferentemente ambas). Fue sugestivo pero no completamente convincente que las sales de Potasio producian una concentracion mas elevada en la sangre despues de las 24 horas.

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Pediatrics

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AMERICAN ACADEMY OF PEDIATRICS, INC. PROCEEDINGS AND REPORTS

TOTAL VOLUME OF MEDICAL CARE FOR CHILDREN BASED ON AN ANALYSIS OF EIGHT STATES

By WARREN R. SISSON, M.D., KATHERINE BAIN, M.D., ROLLO H. BRITTEN, M.A., MARYLAND Y. PENNELL, M.Sc. Hyg., JOHN P. HUBBARD, M.D.
Washington, D.C.

AN ASSIGNMENT has been given to me to present the first official results of the Study of Child Health Services, instituted by the Academy and executed by the Academy with the cooperation of the U. S. Public Health Service and the U. S. Children's Bureau. The paper which I am to read represents the results of work by you and compiled by your Executive Staff of the Study. One would like to conjecture how the future historian of the Academy will evaluate the transactions of this afternoon's session. Certainly this meeting marks a milestone in that it represents an awareness of public health problems, especially those of children, which have never before been so intimately studied. Furthermore, it is noteworthy because of the actual achievement of an investigation of a scope never previously paralleled by a group of physicians. Also the Study has revealed that, with common objectives, groups of physicians in private practice and those from the ranks of academic circles, along with personnel from established governmental bureaus, can work effectively together. It should be reiterated that the Study could not have been accomplished by us as a group of physicians alone nor by any existing governmental department. The two cooperating federal agencies, the U. S. Public Health Service and the U. S. Children's Bureau, have trained personnel with interest and experience in public health problems and in the conduct of large-scale statistical studies. The Academy, on its part, has first-hand experience in medical service and an intimate

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From the American Academy of Pediatrics, Study of Child Health Services, John P. Hubbard, M.D., Director, with the cooperation of the U. S. Public Health Service and the U. S. Children's Bureau.

Read December 9, 1947, at the Annual Meeting of the American Academy of Pediatrics, Dallas, Tex.

knowledge of those who are rendering service to children, and through its various members has been able to impart knowledge which otherwise would not have been available.

Before we attempt to report the results of our Study, it seems pertinent, briefly, to call to your attention other less concrete and tangible results which are already discernible. One must remember that statistical studies have their limitations and that the complete picture of child health services in its various aspects can be given only in part by figures. In fact, many of the figures and results which will be presented to you in future articles may be somewhat uninteresting and not especially revealing. Frequently you will say that we knew this before the Study was instigated, and you may question the efforts expended. I should like to remind you, however, at this time, that without exact figures no positive action for future improvement of child health could be intelligently conceived or executed, and that without studies such as we have made, it would have been totally impossible to record the extent of medical facilities for child care at various levels in the United States, within the states, within the counties and within the cities.

The intangible results of the Study can only be sketched at this time. We have already referred to the fact that members of the Academy have now become aware of problems in public health to a degree which has been unprecedented. Pediatricians have always been interested in preventive medicine, but never have they given such a complete demonstration of interest in the field of public health. They have recognized that the health of individuals depends upon the health of groups and that the health of groups determines the health of the individual. The members of the Academy through this Study, therefore, have become leaders in a field of public health, using the term in the broad sense.

There has developed not only a general interest in the public health aspects of child health but what may be more significant is the specific interest in child health in the child's local habitat. This is illustrated by the development of the Study. When we started to assemble data we did not realize the extent of the local community interest that would be aroused. It was not long before State Chairmen and others were asking, "What are we to get out of this for our own city, town or county?" In accordance with this demand, arising from all over the country, we set out to provide data for every county and every city of 10,000 or more population. There has resulted information which will be available to each state. This will be of great value in improving the level of child health in every community.

As the results of the Study are released at state and national levels, there will come to each member of the Academy a new opportunity and a greater responsibility for child health. Public interest in pediatrics is being accelerated. Pediatricians who have made the Study must give added service, both privately and publicly. Members of your Study staff are already being asked to address groups interested in solving problems in child health throughout the country. General practitioners are requesting instruction in the care of children and this must come through the pediatrician, through his practice, through his consultation contacts, from lectures and publications, thus increasing his responsibility.

Although the Study will show that most of the children in the United States are cared for directly by the general practitioner, it must be remembered that the pediatrician has a much greater influence than these statistics record by virtue of his initial interest, his investigation, his teaching and consultation with general practitioners. A result of the

Study, therefore, is the inevitable increased opportunity in the hands of every pediatrician to direct pediatric progress at every level.

There are many other unrecorded results which will evolve from our Study. These cannot be elaborated here. Already the Study has greatly increased the influence of the Academy of Pediatrics in professional and non-professional circles throughout the country. It has also permitted us as members to investigate the resources of our membership and has paid us many extra dividends in the form of personal gratification from the companionship with each other and many groups working in conjunction with the Academy. There has resulted a mutual understanding of the problems of child health which has greatly enhanced the progress of the Study and placed us in a most strategic position for future progress.

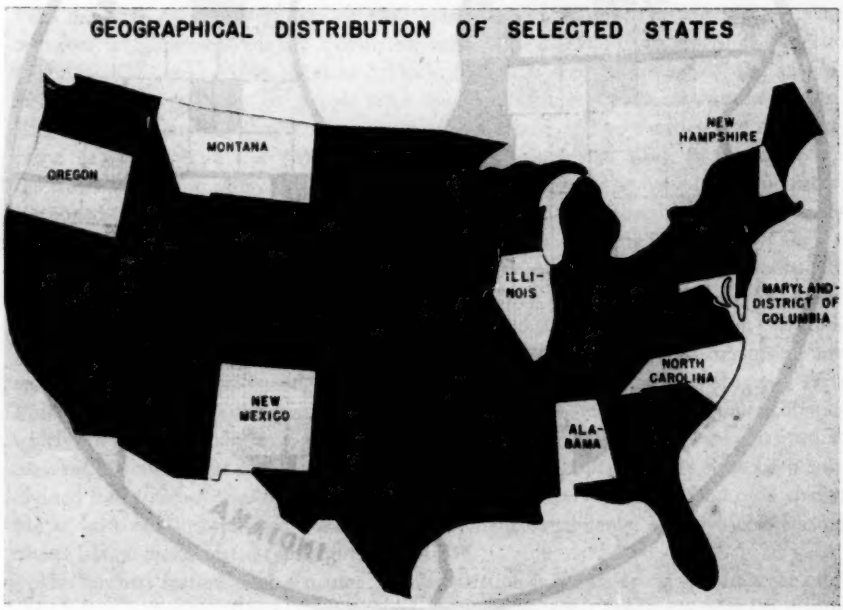

FIG. 1

The data in this and the two succeeding papers should be considered as a preview of a fuller report which will appear next year as a supplement to PEDIATRICS. The analysis of the data is not yet complete, but for the purposes of this meeting we have devised a scheme for studying some of the information in preliminary form. Several states have been selected to form the basis for this preview. In one sense they represent "a little United States," which may be used to show the type of material later to be available for the whole country. In selecting these states, we have attempted to obtain a representative sample of the whole country based upon such considerations as geographic distribution and size of state, per capita income, population distribution between metropolitan and rural counties, and the number of available physicians and hospital beds. This group of states is not truly representative in the strict sense of the word, for the selection

was conditioned by the necessity of having to exclude states that had not yet finished collecting their data. Therefore, we do not consider that our little United States is sufficiently representative of the country to warrant projection of national rates. We do

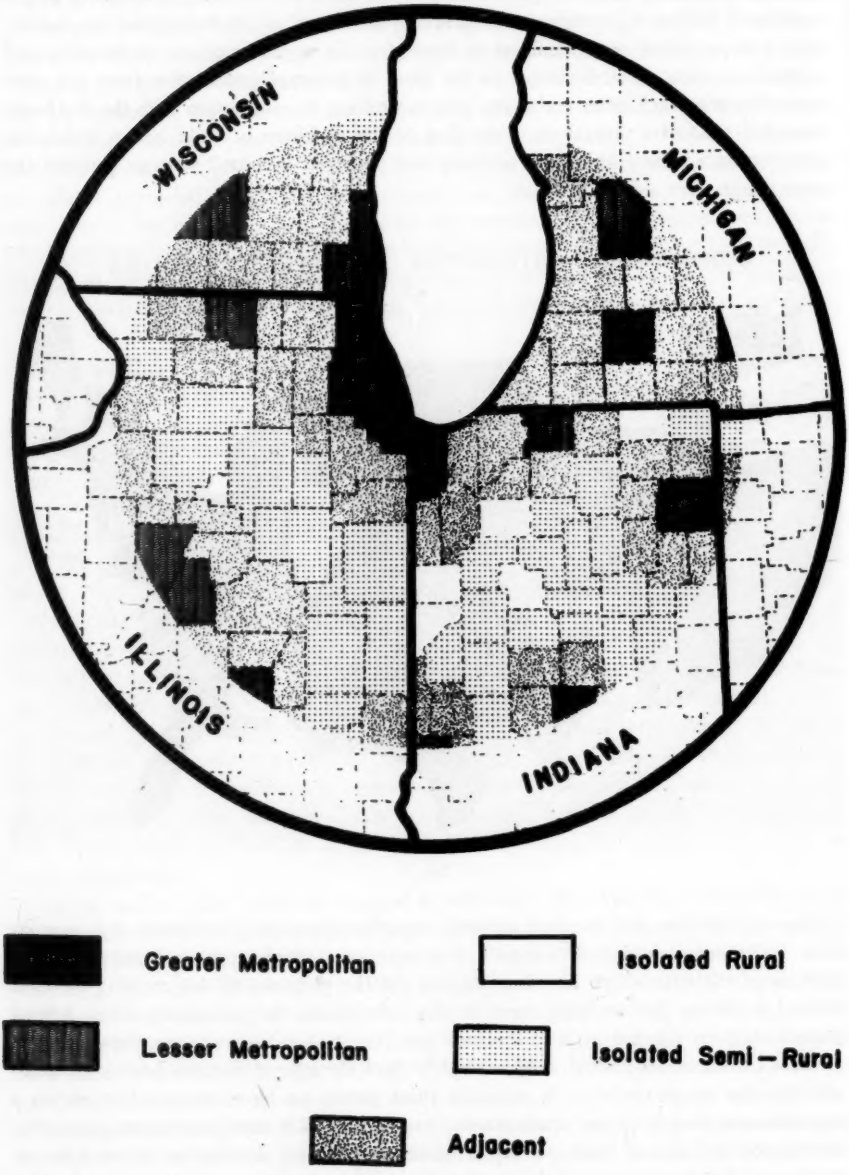

FIG. 2. Example of County Grouping

feel, however, that the analysis of their services will present a useful picture. In terms of broad relationships, the findings that appear in the sample should be indicative of what may be expected from the complete survey. The relationship between urban and rural areas in amount and character of services furnished to children should be a reasonably accurate picture of nation-wide conditions.

The states selected are: Oregon, Montana, New Mexico, Illinois, Alabama, North Carolina, New Hampshire, and a new state which has been "admitted to the Union" for our purposes, composed of Maryland, the District of Columbia, and two counties of Virginia (Fig. 1). This new state was devised primarily for presenting hospital data, since facilities in the District of Columbia serve the surrounding counties. These selected states contain about five and one-half million children under 15 years of age, or approximately 15% of the nation's children.

In the analysis of our Study, we have grouped counties together in order to bring out contrasts between densely populated urban centers and isolated rural counties (Fig. 2). The usual classification of urban and rural is not satisfactory for the analysis of medical care material, for people cross county lines to secure care in nearby centers. We have based our classification and grouping of counties on two fundamental characteristics: (a) population, and (b) proximity to densely populated areas. In this way, consideration is given to counties which, although they themselves may be sparsely populated, are nonetheless relatively close to metropolitan centers and the medical facilities ordinarily available in such centers. Accordingly, we have set up five county groups. Two are described as metropolitan. Metropolitan counties are those which include the metropolitan districts of cities of 50,000 or more inhabitants. They are divided into *greater metropolitan* and *lesser metropolitan,* a greater metropolitan county being one in which is located any part of the metropolitan district of one million or more inhabitants in and around the cities of Baltimore, Boston, Chicago, Cleveland, Detroit, Los Angeles, New York, Philadelphia, Pittsburgh, St. Louis, San Francisco, and Washington. Counties which are geographically contiguous to any of the metropolitan counties are classified as *adjacent.* Counties that do not touch any part of a metropolitan county have been subdivided into *isolated semi-rural* and *isolated rural* counties. An isolated semi-rural county has at least one incorporated place of 2,500 or more inhabitants, and an isolated rural county has no incorporated community of that size.

The unusual feature of this manner of classification is in the use of the adjacent category.* It is recognized that a large hospital in an urban center serves not only the county in which it is located but also the surrounding counties. It is here that the use of the term adjacent is particularly suitable. By grouping metropolitan and adjacent counties together, we have established a reasonably reliable service area for hospitals which may be compared with the combined isolated counties. On the other hand, it is fair to assume that physicians, particularly general practitioners, tend to limit their practice to the communities in which they live or to the immediately surrounding territory. Therefore, data on physicians' services are tabulated separately for each of the five county groups. For the purposes of this paper, which include all types of medical care—that given in the local community and that which the patient seeks in a medical center—we have used two broad county groups: (1) metropolitan and adjacent counties which may be said to

* Acknowledgement is made to Elliott H. Pennell and the staff of the States Relation Division, U. S. Public Health Service, for the basis of this classification.

represent urban areas and those areas with easy access to urban centers, and (2) isolated counties which are those neither urban nor near urban centers.

In any study of the adequacy of services for children, one is immediately confronted with the desirability of having a measure of the amount of care which children need. Though no such yardstick is at present available, it has seemed profitable to examine the total amount of care children are now receiving. A composite picture of the total volume of medical care rendered to children on an average day has been obtained by adding together: (a) the medical care rendered to children by physicians in private practice,*

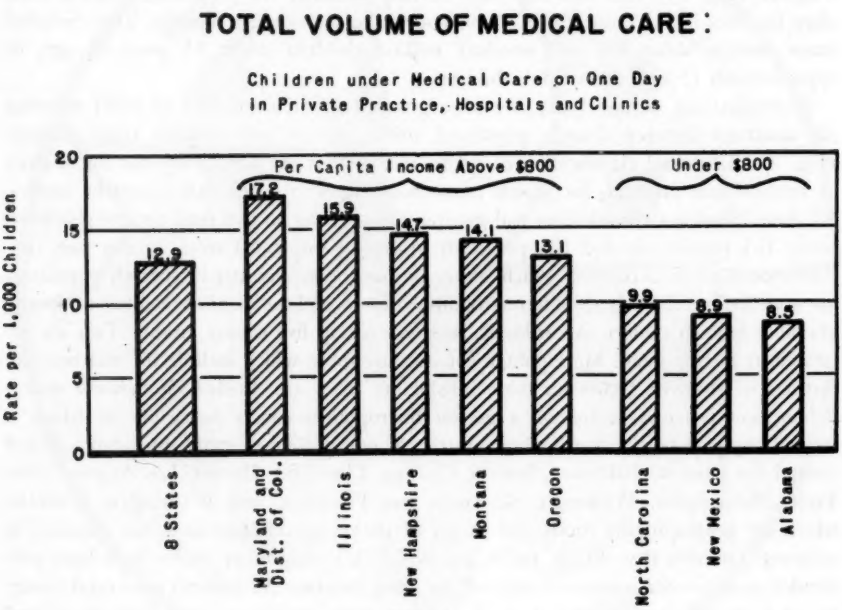

FIG. 3

(b) the medical care and health supervision given to children in clinics and conferences, and (c) the medical care given to children in hospitals. This summation may be said to represent the total number of children under medical care on one day, and when related to child population gives a valid and useful index of the total volume of medical care.

The primary purpose of attempting to establish a quantitative estimate of the total volume of medical care is to provide a means of making comparisons among states and areas differing in population, geographic and socio-economic characteristics. The areas in which children receive the greatest amount of care are not necessarily getting enough, nor is the quality necessarily high. We have no standard which represents adequacy. These better supplied areas, however, do serve the purpose of allowing comparisons to be made.

The first column in Figure 3 shows that on an average day in these eight states, 13 out

* To avoid duplication of hospital care for children, the private practitioners' visits to children in hospitals have been omitted.

of 1,000 children were receiving medical care. This rate, taken by itself, has little meaning. The rates for the individual states, however, are of considerable interest, for they show the contrast that exists within this sample.

In Figure 3 can be seen the wide range in the total amount of medical care received by children in different states. A child in our so-called state of Maryland-District of Columbia gets twice as much care as one in Alabama. The five states that have the highest rate of care are in the upper income group, over $800 per capita,[1] while the three states receiving the least amount of care are in the lower income group, below $800 per capita.

TABLE I. CHILDREN UNDER MEDICAL CARE ON ONE DAY, METROPOLITAN AND ADJACENT, AND ISOLATED COUNTIES IN 8 SELECTED STATES

	Rate per 1,000 children		Index
	Metropolitan and adjacent counties	Isolated counties	Metropolitan and adjacent = 100
Total volume	*14.1*	*10.3*	73
General practitioner visits	7.8	7.5	96
Pediatrician visits	1.6	0.36	23
Other specialist visits	1.3	0.69	53
Clinic visits	0.62	0.14	23
Hospital days	2.8	1.6	57

Using the county group classification, we see (Table I) that children in or near urban centers receive more medical care than those in other areas. The composition of that difference is of very great interest. One surprising finding is that general practitioner care is received in almost equal amounts by children in these two broad groups of counties. If the five county groups are studied separately, there is much less care given by general practitioners in the isolated rural counties. To bring out more clearly the comparisons between the two broad groups of counties, an index is shown in the right-hand column, this index being the ratio of the rate in the isolated counties to that in metropolitan and adjacent counties. The ratio of general practitioner visits for such care is 96. Where the children away from cities lose out is in: (a) pediatrician care (ratio of 23), (b) other specialist care (53), (c) clinic care (23), and (d) hospital care (57). They receive only from one-fourth to one-half as much of the kind of care that is composed of expert diagnostic skills and specialized treatment facilities. In these selected states, two million out of the five and one-half million children are short-changed in what the Academy report authorizing this Study spoke of as "essential . . . diagnostic and curative medical services of high quality."

One is tempted to speculate about the possible results of such lacks as are displayed in this material. In these eight states the infant mortality rate for the metropolitan and adjacent areas is 38.2 deaths per 1,000 live births; for the isolated counties 50.6. Many factors besides medical care have entered into these infant mortality rates such as economic status, housing, sanitation, quality of milk supply, and education of parents. It is not unfair to say, however, that one among many factors weighting the scale in favor of the urban babies has been their ready access to the type of care which represents our greatest medical skills.

Though the number of children in hospitals on one day is small compared to the total number of children under care—20 out of 100—hospital care is nevertheless one of the

important elements in the total picture of child care. Perhaps extra weight should have been given to the element of hospital care in calculating the total volume of medical care. The Study staff gave serious consideration to this but could arrive at no formula for weighting hospital care in comparison with physician visits and clinic visits. Equal weight has been given to all three, a physician's visit, a clinic visit, and a day of hospital care. Had additional weight been given to hospital care, the contrast among states and between urban and rural areas would have been even greater.

Of the total amount of hospital care for children, more than half now goes to newborns. Births in hospitals each year exceed in number the admissions of sick children of all ages. Such data carry implications for pediatricians for leadership in hospital planning and in conduct of nursery care.

Previous to this Study no data existed on children's admissions to hospitals. Such material coming out of this Study is already proving useful. From the ratio of child admissions to the number of beds in general hospitals, it is possible to estimate the number of beds which should be provided in pediatric units in new general hospitals. From these first returns a provisional estimate indicates that at least 12% to 15% of the beds in general hospitals should be allocated for children other than newborn. Local factors, such as the existence of a nearby children's hospital, should, of course, be taken into account in determining how many beds to set aside for children in a general hospital.

TABLE II. CHILDREN RECEIVING HEALTH SUPERVISION ON ONE DAY IN 8 SELECTED STATES

	Number per 100,000 children	Percent
Total children, exclusive of newborn	*249*	*100*
Visiting general practitioners	157	63
Visiting pediatricians	63	25
Visiting other specialists	4	2
Visiting child health conferences	25	10

It has already been shown how the total volume of medical care on one day can be fractionated into parts on the basis of who renders the care. Another desirable breakdown is according to purpose for which care is sought or given. It is possible to extract the care for health supervision and study it more closely. Of the total number of children, exclusive of newborn, under medical care on one day, about one-fifth are under care for health supervision. Table II shows how this volume of care is distributed among physicians and well-child conferences. The bulk of care is, of course, rendered by general practitioners. Pediatricians give about one-fourth of the care, and child health conferences one-tenth. A more detailed breakdown of physician visits for sick and well care will be given in the next paper.

It is often stated that though gaps do exist in the distribution of private medical care, community health services provide some compensatory care. One might expect the gaps to be bridged somewhat by the extra provision of community health services to children in those areas where private physicians' care and hospital service are low. Material so far available shows the opposite to be true.[2] Two items—well-child conferences and public health nursing—will serve to show that those states with low rates for total volume

of medical care have also low rates of community health services and that metropolitan and adjacent counties continue to enjoy an advantage over isolated counties. The number of children visiting well-child conferences on one day out of 100,000 children in the population in Maryland-District of Columbia is 57 and in Illinois 36, while Alabama and New Mexico have only 7. Home visits to children by public health nurses in Illinois are almost six times as frequent as in Alabama when related to child population. Figures 4 and 5 show the variation that exists between the provision of these two items in metropolitan and adjacent counties and in isolated counties.

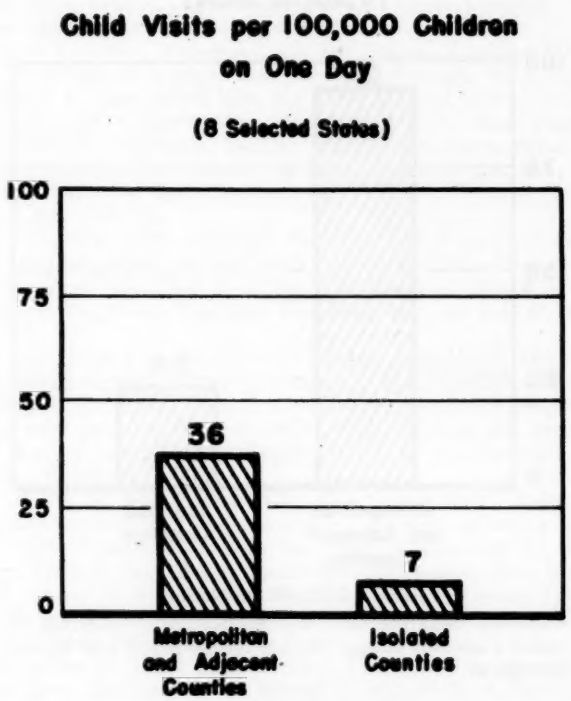

FIG. 4. Child Health Conferences

The full Study report will carry a great wealth of detail which will serve as a basis for planning now, and for many years will be used as basic reference material on child health. From the material now available based on eight selected states, the following generalizations on total volume of medical care for children can be made:

1. Inequality exists in the amount of medical care received by the children in different parts of the United States. Children in some states receive only half as much care as those in other states.

2. Children in or near large cities receive more care than children in areas without ready access to urban centers.

3. The child in rural areas is handicapped, not so much in general practitioner care as in specialist care, clinic care, and hospital care, or the highly skilled diagnostic and treatment services.

4. Existing community health services in isolated areas are inadequate to modify the

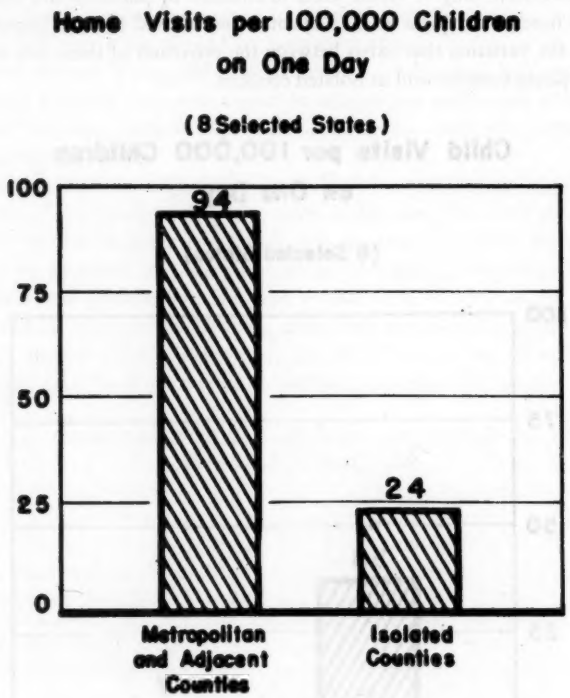

FIG. 5. Public Health Nursing

Correction: Since this chart was prepared further study has revealed a necessary change. The left column should total 84, and the right 25.

level of care in these areas. Community health services are more abundant where more and better child care already exist.

REFERENCES

1. Schwartz, C. F., and Graham, R. E., Jr., State Income Payments in 1945, Survey of Current Business 26:8, 1946.
2. Williams, C. L., Jr., Hubbard, J. P., and Bain, Katherine, Community Health Services for Children in Eight Selected States, Am. J. Pub. Health, 38:75, 1948.

2346 Massachusetts Ave., N.W.

REPORT OF THE EXECUTIVE BOARD MEETING

Friday Session, December 5, 1947

A meeting of the Executive Board was held at the Hotel Baker, Dallas, Tex., on Friday, December 5, 1947. It was called to order at 11:30 a.m. by the President, Dr. Lee Forrest Hill. There were present Drs. Hill, Stringfield, Beaven, Spickard, Munns, McElhenney, Martmer, Pease, Bruce, Barba, Quillian, and Grulee.

The Secretary read a letter from Katharine F. Lenroot, Chief of the Children's Bureau, F.S.A., asking that the Academy designate a representative to serve in an advisory capacity to the U. S. Planning Committee for the Children's Congress in Caracas, Venezuela, which is to meet in Washington, December 8. Dr. Harry A. Ong of Washington, D.C. was so designated.

The following applicants were approved for fellowship:

District I: Oscar Z. Dashef, Woonsocket, R.I., Eric Denhoff, Providence, R.I., Edward Scott O'Keefe, Lynn, Mass., Ralph D. Sussman, Burlington, Vt., and Douglas W. Walker, Laconia, N.H.

District II: Joseph A. Costa, Bedford Hills, N.Y., Gerti Dooneief, Bedford Hills, N.Y., Bernard Greenberg, Brooklyn, N.Y., Herbert Kahan, New Rochelle, N.Y., Philip Frederick Lustbader, Brooklyn, N.Y., Simon B. Mendelsberg, Brooklyn, N.Y., Peter A. Perillo, Jackson Heights, N.Y., Edward T. Reilly, Brooklyn, N.Y., Alexander S. Rosen, Jackson Heights, N.Y., Bernard Harold Shulman, Brooklyn, N.Y., Saul Starr, Brooklyn, N.Y., David H. Weintraub, Buffalo, N.Y., and Harry Zuckerman, New York, N.Y.

District III: Frederick A. Miller, Pittsburgh, Pa., and Samuel Prince, North Bergen, N.J.

District IV: Juan Basora-Defillo, Santurce, Puerto Rico, Maynard Irving Cohen, Washington, D.C., Lawrence Robert Leviton, West Palm Beach, Fla., Jean McAllister, Greensboro, N.C., Meyer B. Marks, Miami Beach, Fla., Theresa Ting Woo, Washington, D.C., and Lynn W. Whelchel, Miami, Fla.

District V: John Edward Ghory, Cincinnati, O., Ramon A. Henderson, Muncie, Ind., William F. Hunting, Cincinnoti, O., Irvin R. Itkoff, Cincinnati, O., John D. Nourse, Cleveland, O., Donald T. Rendel, Hammond, Ind., Nelson W. Ryan, Cincinnati, O., Theodore K. Selkirk, Cincinnati, O., B. J. Siebenthal, South Bend, Ind., William Clifford Vance, Richmond, Ind., Henry H. Work, Jr., Louisville, Ky., Carl Edward Zeithaml, Cleveland, O., William Kerr Zollinger, Toledo, O., and Ralph Leo Zucker, Toledo, O.

District VI: Charles W. Ihle, Jr., Sioux Falls, S.D., Herbert Richard Kobes, Springfield, Ill., Franklin J. Mellencamp, Milwaukee, Wis., and Walter S. Polacheck, Milwaukee, Wis.

District VII: Oscar F. Bradford, Columbia, Mo., Beach M. Chenoweth, Jr., Birmingham, Ala., Raymond Cohen, Houston, Tex., Thomas Joseph Donovan, Houston, Tex., James N. Etteldorf, Memphis, Tenn., Edward O. Fitch, Houston, Tex., Elizabeth Gentry, Austin, Tex., George Wainwright Griffin, Birmingham, Ala., Oliver William Hill, Knoxville, Tenn., Conway Stone Magee, Lake Charles, La., and Mildred Stanley, Tyler, Tex.

District VIII: Robert S. Cleland, Pasadena, Calif., Donald G. Evans, Seattle, Wash., Mariana Gardner, Denver, Colo., Max Goodman, San Bernardino, Calif., Walter A. Goss, Jr., Portland, Ore., Harry Osbourne Ryan, Pasadena, Calif., and Cire Celia Scheer, Seattle, Wash.

District IX: It was moved, seconded and carried that the applicants in District IX be accepted, pending approval by Dr. Hurtado: Maria Luisa Aguirro, Cordoba, Argentina; Alberto Chattas, Cordoba, Argentina; Felipe de Filippi, Buenos Aires, Argentina; Alberto G. Gimbirassi, Buenos Aires, Argentina; Pérlina Winocur, Buenos Aires, Argentina; Breno Barcellos, Porto Alegre, Rio Grande do Sul; Haroldo Beltrao, Curitiba-Parana, Brazil; Adauto Coehho de Rezende, Rio de Janeiro, Brazil; Edecio Cunha, Recife, Brazil; Gastao de Figueriredo, Ipanema, Rio de Janeiro, Brazil; Alfranio Raul Garcia, Botafogo, Rio de Janeiro, Brazil; Berardo Nunan Filho, Belo Horizonte-Minas, Brazil; Edgard Pinheiro Lobo, Sao Paulo, Brazil; Martinho da Rocha, Copacabana, Rio de Janeiro, Brazil; Carlos Castelpoggi Rocha Braga, Rio de Janeiro, Brazil; Paulo Roxo da Motta, Belo Horizonte-Minas Gerais, Brazil; Andres Gonzalo Funes, San Salvador, El Salvador; Santiago Hernandez A., San Salvador, El Salvador; and Gustavo Castaneda, Guatemala.

Emeritus Fellowships were granted to the following: Robert E. Ramsay, Pasadena, Calif., Frank M. Sprague, Boise, Id., Fritz B. Talbot, Brookline, Mass., Noel C. Womack, Pocahontas, Miss., and Harvey O. Rohrback, Danielsville, Pa.

Resignations were accepted from the following: Capt. Ernest S. V. Laub, MC., USN, Corona, Calif., and P. F. Lucchesi, Philadelphia, Pa.

The history of the Academy, as prepared by Dr. Marshall C. Pease, was presented. It was moved, seconded and carried that ways and means of publishing the history be found and that a report be made at the June meeting of the Executive Board.

The proposed surgical and medical care program for employees of the Academy was approved, to be put into effect when there are five employees desiring it.

The present organization of the business affairs of the Academy was discussed. It was the opinion of the Executive Board that the present organization, together with the expanded administration of the I.C.H. Committee, meets the needs of the Academy at the present time.

Dr. Harry Bakwin was appointed as Alternate District Chairman of District II for another term.

Dr. Edward A. Wishropp was appointed Alternate District Chairman for District V for another term.

Dr. Julian Feild was appointed State Chairman for Oklahoma.

Dr. Crawford Bost was appointed Alternate District Chairman for District VIII.

The report of the Committee on a Museum and Library was presented by Dr. Martmer. The following five suggestions submitted by the Committee were approved: 1. That the name of the Committee be changed to "The Building Committee." 2. That the membership of the Building Committee be increased to nine members. 3. That a fund be established, to be known as the "Building Fund," for the purpose of accumulating funds for the establishment of a permanent headquarters to house the central office activities, library facilities, and space for articles of historic value, at a time and place to be selected when sufficient funds are available. 4. That the Executive Board allocate a sum of money to start the Building Fund and a sum be set aside each year in the budget to be added to the Building Fund. 5. That the Building Fund be subject only to the action of the Executive Board through the Secretary.

A Budget Committee consisting of three members was appointed by the President.

The question of a time limit for cancelling reservations for seminars and round tables was discussed. It was moved, seconded and carried that return of registration fee for seminars will not be made unless registration is cancelled at least one month in advance of the meeting. It was moved, seconded and carried that reservations for round tables will not be accepted after a date two weeks prior to the meeting; however, vacancies which exist at the time of the meeting may be filled.

Dr. Joseph A. Johnston of Detroit was designated as Chairman of the Committee on Medical Education.

The meeting adjourned at 5:50 p.m.

Saturday Session, December 6, 1947

The meeting was called to order at 9:25 a.m. by the President. The members present on Friday, with the addition of Dr. Toomey, attended this meeting. Drs. McCulloch, McLendon and Ratner attended the afternoon session.

A letter of congratulation was sent to Dr. Isaac A. Abt of Chicago on the occasion of his 80th birthday, December 18, 1947.

It was moved, seconded and carried that Article IV, Section 1, paragraph (e) of the By-Laws be amended to read as follows:

> In the United States, a candidate must have been certified by the American Board of Pediatrics, before being eligible for Fellowship in the Academy; and in Canada a candidate must have been certified either by the American Board of Pediatrics, or by the Board of Pediatrics of the Royal College of Physicians and Surgeons in Canada.

(The rest of the paragraph is to remain unchanged.)

The Secretary read a letter from Dr. Henry G. Poncher suggesting that members of the state medical societies and general practitioners be invited to areal meetings. The suggestion will be tried out at the Milwaukee meeting.

The Secretary read a letter from Mrs. Elisabeth Shirley Enochs concerning the forthcoming Children's Congress in Caracas, Venezuela.

The Secretary read a letter from Miss Lillian Rifkin asking that the Academy approve the Hill Toy Laboratory for sick children. The Secretary was directed to write that the Academy can not undertake such a project at the present time.

The question of prize award tickets, sponsored by exhibitors at Academy meetings, was discussed. The Secretary was empowered to investigate this question and use his judgment concerning it.

The Secretary read a letter from Dr. William J. Orr regarding the reimbursement of scientific exhibitors. Dr. Orr was given $1,000 for the expenses of the Buffalo meeting.

The Secretary read a letter from the American Society of Dentistry for Children. The Secretary was instructed to acknowledge receipt of the letter, stating that the Executive Board expresses its interest in a more close relationship between the Academy and this society, and that the names of Drs. Julian D. Boyd, Iowa City, Joseph A. Johnston, Detroit, and Frederick F. Tisdall, Toronto be suggested as men who might contribute articles to their journal.

The question of whether a charge should be made for extra listings in the Fellowship Directory was discussed. There shall be an additional charge of $5.00 for each additional listing beyond two in the geographic section.

The Secretary read a letter from Dr. Emilio Soto Pradera asking if it were possible to have a travel scholarship for Latin-American students in the United States. The Secretary was instructed to investigate methods of procedure and proceed as he sees fit.

The Secretary presented letters and a chart from Mr. J. J. Quilligan, of the M. & R. Dietetic Laboratories, Inc., showing the set-up of the Academy. The Executive Board expressed to Mr. Quilligan its appreciation of his interest in Academy activities and the Secretary was instructed to write him that his letter and chart produced a great deal of constructive discussion.

The Secretary called attention to the fact that it is not sufficient to type the names of the applicant's sponsors on the application for membership. Personal signatures in ink are necessary.

The Secretary announced the following dates for future meetings:

April 29-30, May 1-2, 1948—Hotel Statler, Buffalo, N.Y.

June 28-30, 1948—Hotel Schroeder, Milwaukee, Wis.

September 13-15, 1948—Olympic Hotel, Seattle, Wash.

November 20-23, 1948—(Annual Meeting)—Hotel Chalfonte-Haddon Hall, Atlantic City, N.J.

May 9-11, 1949—Netherlands-Plaza Hotel, Cincinnati, O.

November 14-17, 1949 (Annual Meeting)—Palace Hotel, San Francisco, Calif.

The appointment of Drs. John P. Hubbard, Félix Hurtado, and Leona Baumgartner as contributing editors of PEDIATRICS was approved.

Dr. Stringfield reported on the Conference on Family Life. It was moved, seconded and carried that the Academy give a token contribution of $50.00 to the Conference on Family Life, and in so doing state that the Executive Board feels that the greatest contribution the Academy can make to the Conference is in the results of the Study of Child Health Services.

Dr. McCulloch reported for PEDIATRICS.

A wire of condolence was sent to Mrs. Neff on the death of Dr. Frank C. Neff of Kansas City.

The following telegram was sent to Mrs. Berkley: "The Executive Board at its session in Dallas records with regret the death of Dr. Hugh K. Berkley, who served with distinction as a member of the Board over a considerable period of years."

Dr. Beaven reported for the Committee on Affiliates, with discussion by Dr. Ratner.

The Executive Board recommended that there shall be a class of membership known as Affiliate Fellows, consisting of surgeons, pathologists, bacteriologists and virologists, roentgenologists and psychiatrists; that there shall be no initiation fee for Affiliate Fellows; and that the annual dues shall be $20.00, which includes subscription to PEDIATRICS.

A subscription to PEDIATRICS is a requirement for membership of each Fellow in the Academy.

The present Committee on Allergy was continued.

The report of the Committee on Affiliate Membership was accepted as amended.

The meeting adjourned at 5:15 p.m.

Sunday Session, December 7, 1947

The meeting was called to order by the President at 9:45 a.m. There were present, in addition to the Board, Drs. Sisson, Wall, McLendon, James R. Wilson, Hubbard and John McK. Mitchell.

Dr. Stringfield read a letter from Dr. L. Emmett Holt, Jr. concerning the International Pediatric Association. The President appointed a committee of three—Drs. Stringfield, Pease and Bakwin—to go over this question and get authoritative information.

A letter of thanks was sent to the Academy members in New York City for their work in connection with the Fifth International Congress of Pediatrics.

The Secretary read a letter from Dr. Herbert R. Kobes, President, Association of Maternal and Child-Health and Crippled Children's Directors, stating that at a recent meeting in Washington the Association indicated a desire to bring to the attention of the Academy the need for better understanding of all physicians regarding the public health aspects of pediatrics. The Secretary was instructed to write Dr. Kobes accepting his kind offer and telling him that the State Chairmen are the official representatives within their states.

Mrs. Darr, Executive Secretary of the Editorial Board of PEDIATRICS, was introduced. She stated that one of the prospective advertisers in the journal wished to use a seal stating that his products had been approved by the American Academy of Pediatrics. This advertiser is to be informed that the Executive Board does not feel ready to give official external Academy backing to advertisers. The proposal was shelved for reconsideration in six months.

The report of the Nominating Committee was received. After discussion the President appointed a Committee of three—Drs. Barba, Quillian and McElhenney—to draw up procedures to be followed by the Chairman of the Nominating Committee. The Committee met and presented the following suggestions for clarification of methods to be used by the Nominating Committee:

The District representative should contact each State Chairman of his District and ask each to submit to him two nominations for the office of District Chairman. He should present to the Nominating Committee the two names receiving the highest vote.

As a matter of policy and in order to insure adequate representation, it is advisable that the District Chairman and the Alternate Chairman should be selected from separate sections of the District.

For the welfare of the Academy, it should be remembered that such officers should be selected on the basis of their ability and willingness to carry out the duties of the office, and not merely to honor a respected and popular Fellow.

This report was accepted.

In connection with the report of the Committee on Improvement of Child Health, the following introductory paragraph was added to the report for the purpose of clarification: (See first paragraph of the committee report.)

The supplementary report presented by the Committee on Improvement of Child Health was accepted.

It was moved, seconded and carried that individuals and committees should not speak for the Academy without authorization from the Executive Board.

The report of the Committee on the Study of Child Health Services was presented by Dr. John P. Hubbard.

The Committee for Improvement of Child Health was authorized to cooperate with a committee recently formed by the American Public Health Association in coordinating its activities.

The Executive Board approved the appointment of the Finance Committee of the I.C.H. Committee as named by the President. The Committee consists of Dr. Henry G. Poncher, Chairman, Drs. Wilson, Munns, Sisson, Wheatley, and Hill and Dr. Grulee, ex-officio.

The Secretary was authorized to announce to the membership that voluntary contributions for the work of the Committee on Improvement of Child Health would be acceptable, and that already $810.00 has been contributed.

Dr. John McK. Mitchell reported for the Committee on Pediatric Education. The report was accepted.

An expression of thanks and appreciation was extended to the staffs of the U. S. Public Health Service and the Children's Bureau for their hearty cooperation and wonderful work in this Study, and that their workers also be commended.

Dr. Wall reported for the Legislative Committee.

It was moved, seconded and carried that Roberts' Rules of Order be used as the official guide in conduct of meetings.

The report and supplementary report of the Committee on Rheumatic Fever were accepted.

The previous action of the Board in permitting the Committee on a Library and Museum to collect funds was rescinded.

It was moved, seconded and carried that the annual dues be $30.00—$20.00 for dues, and $10.00 for PEDIATRICS.

The meeting adjourned sine die at 5:10 p.m.

REPORT OF THE PRESIDENT

Among the activities of the Academy during the past year are three major projects which should be brought to your attention. The first of these is the redistricting of the Academy which was voted at the Annual Meeting in Pittsburgh. The advantages of this arrangement have become increasingly apparent, even with the short period of experience since its inauguration. District Chairmen and Alternate District Chairmen have been appointed with approximately equal numerical representation in each constituency. Areal meetings are being planned by the Secretary's office for two and three years ahead. Thus it will be possible for the membership to know in advance when and where meetings are to be held. The advantages of being able to plan the meetings in advance and to make arrangements with commercial exhibitors through the central office have already demonstrated the wisdom of the redistricting idea. The inclusion of several districts in an areal meeting should largely meet the objections of those who feared that the redistricting would separate those closely situated geographically.

Your President attended the meeting of District IX (the Pan-American Congress of Pediatrics) in Washington, D.C., in July and the meeting of Districts VI, VII and VIII in Salt Lake City in September. Both meetings were most successful. Particularly the Academy should feel gratified over the success of the First Pan-American Congress. What this and subsequent meetings of District IX may mean in friendships, exchange of scientific information, and international good will can not be accurately foretold; but that the ultimate benefits to each continent will be considerable is without question.

The second project is the Academy's new journal PEDIATRICS the first issue of which will appear in January 1948. Dr. Hugh McCulloch is Editor-in-chief and the same Editorial Board is serving PEDIATRICS as served *The Journal of Pediatrics*. Charles C Thomas, Publisher, of Springfield, Ill., is the publisher. Your President attended a meeting of the Editorial Board in Stockbridge, Mass., in May and can assure you that it is the intention of this Board to produce a pediatric journal of a high order of excellence. Not only should PEDIATRICS be a financial asset to the Academy in years to come, but it should be a source of scientific information which will appeal to every subscriber.

The third activity of the Academy is the work of its various committees. The Committee on Study of Child Health Services is in the final stages of its important project. Collection of data is practically complete. Statistical analysis of this material is now being tabulated in Washington. Tables are being sent out to State Chairmen as rapidly as possible. Reports at state levels are being prepared and the over-all national report will be ready for release by July 1948, or shortly thereafter.

A great deal of time and effort have gone into the organizational work of the Committee for Improvement of Child Health. The important preliminary stages are now past and the Committee will shortly undertake the study of certain specific projects which have been revealed by the Study as being of primary importance. This new field of endeavor which the Academy has entered may be looked upon, in a sense, as research in the field of pediatric public health. The opportunities for accomplishment are limitless. The Academy may well view with satisfaction the enlistment of its individual and collective potentialities in this important phase of medical practice.

Many other committees have important programs underway. Especially that of the Committee on Fetus and Newborn should be mentioned. It promises to be of vital importance to every hospital in the country having an obstetric service. It is hoped that all Committee reports will be carefully read by every Academy member.

The year of 1947 has been a busy one and a fruitful one in the affairs of the Academy. Certainly it may be said that the Academy has now assumed adult stature, and is an organization of which we may all be proud.

On behalf of the Academy, I should like to take this opportunity to extend appreciation and thanks to all Committee Chairmen, members of committees, State Chairmen, District Chairmen, and Alternate District Chairmen for their splendid cooperation and efficiency during my year of administration.

Respectfully submitted,
LEE FORREST HILL
President

REPORT OF THE SECRETARY

The Academy has had a most eventful year. It has carried out what was apparently a very successful Pan-American Congress at Washington and has taken part in the Fifth International Congress of Pediatrics, the results of which far surpassed what we had expected. These are just outward evidence of the Academy's growing importance.

We are about to tabulate the results of a survey of child health activities in the United States, a parallel to which as far as your Secretary knows, has never been undertaken. This is a most successful effort due primarily to the efficiency of the Director. We must not forget that it is only because of the organization within the Academy that a Director, no matter how efficient he might have been, could have made this a success. We cannot give too much credit to our State Chairmen nor to the state medical societies, state dental societies and our other friends who have helped in this undertaking. I wish here to extend to all of them my heartiest thanks and that of the Academy.

The termination of this Study brings to us the necessity for approaching the results of the Study in the most careful and open-minded manner. For this purpose the Executive Board has appointed a Committee for Improvement of Child Health about which all of you know. This Committee is an advisory committee to the Executive Board. It will require a great deal of effort and money for this group to function in a fact-finding and advisory capacity. We have undertaken again a task which appears almost impossible, but we have hopes that in some way we will be able to carry on.

Whether due to the efforts of the Study or for other reasons the Academy is no longer a society but an institution. More and more the people of this country and especially members of the medical profession are looking to us for the answers with respect to child health and care. We are reaching a crucial point in our work and one which may well affect very definitely the future of the entire medical picture. We must move carefully and logically but we must move steadily.

For some reason or other, perhaps due to the stimulus given to the Academy by the Study, there is a ferment working in the Academy which is shown by the increased efforts of nearly all of the committees. These have been aroused to renewed activities and are, many of them, doing excellent jobs. We can look more and more to them when determining the course of the Academy's future.

I cannot conclude my report without stressing the stimulating and progressive attitude which the President, Dr. Lee Forrest Hill, has taken towards the activities of the Academy, and without mentioning the very excellent history of the Academy which has been written by Dr. Marshall C. Pease. What use the Academy will make of this history and how it will be possible to present it to the membership is a matter for the Executive Board to decide. It is a valuable document from the standpoint of the future of the Academy.

The new journal, PEDIATRICS, is now on its way, thanks to a splendid Editorial Board headed by Dr. Hugh McCulloch and a Publication Committee headed by Dr. Frank H. Lancaster. It has been no easy task to get into being; but with the cooperation of the publisher, Mr. Charles C Thomas, we are assured a journal which will be a credit to the Academy and which probably in the not distant future will be a source of income which we can devote to other activities.

The redistricting is working out very well and seems to have met with no objections on the part of the members after they became acquainted with its possibilities. The shifting of the responsibilities for meetings to the central office has resulted in an earlier contact with hotels in various cities and consequently an arrangement for meetings well into the future.

All in all the Academy seems to have grown up and to have taken upon its shoulders the duties which come from an adult existence and I think we may all be proud of what we have accomplished and look forward with confidence to the future. The number of members is now 2234.

It is my unfortunate duty to have to report the following as having died since my last report to you:

Dr. Joseph V. Bergin, Paterson, N.J.
Dr. Hugh K. Berkley, Los Angeles, Calif.
Dr. Charles J. Bloom, New Orleans, La.
Dr. George B. Cornick, San Angelo, Tex.
Dr. Frank C. Neff, Kansas City, Mo.
Dr. Martin D. Ott, Davenport, Iowa (Emeritus)
Dr. James S. Plant, Newark, N.J. (Associate)

Respectfully submitted,
CLIFFORD G. GRULEE,
Secretary

REPORT OF THE TREASURER

Statement of Receipts and Disbursements July 1, 1947 to October 31, 1947

Balance in checking a/c—July 1, 1947			$ 11,920.07
Balance in savings a/c—State Bank & Trust Company			13,371.07
Balance in savings a/c—First National Bank & Trust Co.			8,321.29
			33,612.43
Receipts:			
Dues		$38,770.75	
Exhibits—Areal Meeting, S.L.C., Sept. 1947		250.00	
Annual Meeting, Dallas, Dec. 1947		6,990.50	
1st Pan-American Congress Meeting, Cash taken in		1,998.00	
Areal Meeting, S.L.C., Cash taken in		1,449.50	
Annual Meeting, Dallas—Allergy Seminar		500.00	
Blood Seminar		475.00	
Registration		3,096.00	
Round Tables		1,913.00	
Initiation Fees		2,250.00	
Interest Earned		327.50	
Pamphlets—Child Health Record	$ 103.31		
Immunization Procedures	73.32	176.63	
Committee—Improvement Child Health		300.00	
Amount received from Region IV		766.68	
Certificate		1.00	
PEDIATRICS		9,980.00	69,244.56
			102,856.99
Disbursements:			
Annual Meeting—Dallas, Dec. 1947		1,191.02	
Pittsburgh, Feb. 1947		64.63	
Areal Meeting—Salt Lake City, Sept. 1947		2,588.72	
Bank Charge and Exchange		28.36	
Certificate Expense		.77	
Executive Board		2,720.11	
Miscellaneous		765.19	
Office Supplies & Equipment		86.53	
1st Pan-American Congress		12,276.02	
PEDIATRICS		9,889.50	
Postage		327.66	
Rent		903.34	
Salaries—Secretary	$5,333.34		
Assistant Secretary	1,000.00		
Office	2,304.19	8,637.53	
Stationery & Printing		312.57	
Telephone & Telegrams		165.77	
Treasurer's Bond		82.50	
Travel—Secretary		567.20	
Expense—Districts	130.00		
States	65.47		
Committees	3,603.69	3,799.16	
Pamphlets—Child Health Record	16.66		
Immunization Procedures	6.76	23.42	
International Congress Assessment		530.00	44,960.00
Balance—October 31, 1947			$57,896.99
Balance in checking a/c—October 31, 1947		$33,187.95	
Balance in savings a/c—State Bank & Trust Company		15,621.07	
Balance in savings a/c—First National Bank & Trust Co.		9,087.97	
		$57,896.99	

REPORT OF DISTRICT I

Dr. Harold Root, State Chairman for Connecticut, is arranging a meeting for the fellows of his state for January. At that time the most recent information regarding Academy activities and the future plans on child care will be brought to them. The fellows in Massachusetts will be informed at the meeting of the New England Pediatric Society.

On September 28 a meeting of State Chairmen for District I was held in Boston. All the State Chairmen, except one, were present. Dr. Warren Sisson gave a detailed report of the I. C. H. Committee meeting held September 21 and 22. His report was exceptionally well received and the State Chairmen were grateful to have the work of the committee explained.

The State Chairmen discussed the future organization of the Academy and recommended that the Executive Board "start the ball rolling" by appointing a committee to really put their teeth into the study of the organization of the Academy and to make recommendations to the Executive Board.

Respectfully submitted,
OLIVER L. STRINGFIELD, *Chairman*

REPORT OF DISTRICT II

The main activity in our District since the last report has been concerned with the Study of Child Health Services. The first phase of this enterprise was terminated officially July 15. Over 22,000 physicians in practice other than pediatrics were sent reports and 73% returned them. Of the 693 pediatricians who were asked to give more detailed reports, 77% returned completed schedules. Of 654 hospitals, 552 returned completed schedules, which is 85%. 11,256 dentists were mailed schedules and of these 6,194 returned them completed, which is 55%. At the present time a spot survey of the State is being conducted which will act as a comparison and check to the data which we have already obtained.

It is with great satisfaction that we report that we had excellent cooperation given us by physicians, voluntary agencies, county medical societies, the State Medical Society, and the State Health Department. Dr. John Bourk, the state director of the National Hospital Study, has worked with Dr. Wheatley, and this has been of mutual benefit.

A meeting was held October 21 in New York City at which Drs. Wheatley, Orr, Givan, Wilke, and myself planned the details of the next step, which will be to evaluate the significance of the findings which will come from Washington.

Respectfully submitted,
PAUL W. BEAVIN, *Chairman*

REPORT OF DISTRICT III

Organization work is going on and there will be a more comprehensive report at the next meeting when present plans have had more time to mature.

Respectfully submitted,
PHILIP S. BARBA, *Chairman*

REPORT OF DISTRICT IV

Compilation of data concerning the study has been completed in most states and material is now being studied by various State Chairmen.

It is planned to combine meetings coincident with such groups as the Southern Medical and various state medical associations in order to conserve time for the busy pediatricians.

Respectfully submitted,
WARREN W. QUILLIAN, *Chairman*

REPORT OF DISTRICT V

The Study of Child Health Services has been completed in all the states of District V. The inspection of medical schools will be finished in the near future.

In Michigan with the financial backing of the Kellogg Foundation and under the chairmanship

of Dr. R. M. Kempton of Saginaw and Dr. Cummings of the State Health Department, a committee is studying the problems of diarrhea of the new born. In Kentucky a splendid post-graduate course in pediatrics was given. In Ohio, pediatricians are found active on all important committees working with child welfare, such as crippled children, infantile paralysis, rheumatic fever, etc.

Respectfully submitted,
JAMES W. BRUCE, *Chairman*

REPORT OF DISTRICT VI

Three states have matters of particular interest to report concerning Academy activities.

In Illinois under Dr. Poncher's leadership, the Academy has been active in integrating the program for rheumatic fever through the Chicago Council on Rheumatic Fever which is set up with Dr. Stanley Gibson as Chairman. The object is to develop a program on a state wide basis.

Up until this time school health examinations as conducted in Illinois have been unsatisfactory. Dr. Poncher has suggested that the Illinois P.T.A. request from the Illinois State Medical Society a Committee on School Health Examinations. This committee would be asked to prepare satisfactory and standard forms for the examinations and, through a code system, make the results of these examinations available to all interested agencies in the state. Such a system should be of great help for case finding agencies in the screening of rheumatic fever and of other diseases on which adequate information has not been available in the past.

An exhibit on the Miracle of Growth at the Museum of Science and Industry is now open to the public. This exhibit is sponsored by the University of Illinois and was planned by Dr. Poncher with the consultation of Drs. Aldrich, Gesell, Washburn, and other members of the Academy. The purpose of the exhibit is to educate the public in the problems related to growth and development and adolescence including both the emotional and physical aspects.

From South Dakota, Dr. Goldie E. Zimmerman, Chairman, reports that Dr. Ihle has been appointed chairman of the state's American Legion Child Welfare Division.

From Wisconsin, Dr. H. Kent Tenney, Chairman, reports that the Academy has been instrumental in affording orthopedic residents special training in cerebral palsy. These men, in correlation with the Department of Physical Medicine in the University of Wisconsin, expect to do research in the neuro-physiology of this condition.

Respectfully submitted,
GEORGE F. MUNNS, *Chairman*

REPORT OF DISTRICT VII

Tennessee was the first to complete the survey in our district, and much credit should go to Drs. Overall and Levy for their enthusiasm and efficiency in compiling their data quickly.

Dr. Webb of Louisiana in consultation with Dr. Platou, president of the Louisiana State Pediatric Society, reports the formation of a committee to study and analyze the report returned from the central office and to publish this final report in the *New Orleans Medical and Surgical Journal* in serial form. The Louisiana State Pediatric Society decided to hold quarterly meetings and it is anticipated that the primary work of the Society will be centered around the State Study and the recommendations coming out of it.

Most states have reported the formation of a state committee on Fetus and the Newborn to work in conjunction with Dr. Clifford and his national Committee.

Active state pediatric societies are reported from nearly every state in the district with very interesting programs planned and executed.

The Texas Pediatric Society has endorsed all the immunization procedures suggested by the Academy.

Texas pediatrics has been materially advanced by the efforts of Dr. Hansen, director of the Texas Child Health Program. We are fortunate to have the Buchanan Foundation which is interested in the Child Health Program and the Hogg Foundation under leadership of Robert Sutherland which is primarily interested in mental hygiene in Texas.

Respectfully submitted,
THOMAS J. MCELHENNEY, *Chairman*

REPORT OF DISTRICT VIII

District VIII is glad to report a very successful areal meeting at Salt Lake City in September. The meeting was well attended mostly from the membership of District VIII, but a few came from Districts VI and VII. Dr. John Anderson and his Committee arranged the program, which was very enthusiastically received.

In behalf of the District VIII membership, I would like to extend an invitation to our 1948 areal meeting and hope to have a larger representation from the two adjoining districts.

Respectfully submitted,
VERNON W. SPICKARD, *Chairman*

Standing Committees With State Activities

REPORT OF THE COMMITTEE ON COOPERATION WITH AMERICAN LEGION

The process of reorganizing the liasion officers of the Academy at a district and state level is proceeding steadily.

Many of the state liaison officers have been appointed, and it is hoped that within a short period of time the Academy will have at least one pediatrician in each state who will act in an advisory capacity to the Child Welfare Committee of the American Legion. When that stage is reached the state liaison officers are to try to have as many pediatricians as possible act in an advisory capacity to the Child Welfare Committees at a post level.

Some of the district liaison officers have been extremely active and helpful, especially Drs. Smith, Gillespie, and Molony.

Several fine articles on pediatric medical subjects, written by outstanding authorities, have been published in the LEGIONNAIRE, national magazine of the Legion. A shortage of newspaper print still prevents these articles from being published in anything except a very abbreviated form. No new articles are being solicited until the present ones are in line for publication.

The National Child Welfare Division recently requested information concerning names of surgeons and pediatricians qualified in the diagnosis and surgery of congenital cardiac disorders. Many Legion posts are raising the money for such operations, and the National Child Welfare Division felt that the Committee on Cooperation with the American Legion could advise properly in such a way as to channel these cases into the most reliable centers. Letters were written to Drs. Alfred Blalock, Helen Taussig, and Robert Gross. As a result of confidential information received from these sources, a very complete list of pediatricians and surgeons who have exhibited competence in the handling of such cases was sent to the National Child Welfare Division. This is an example of the way in which Academy members can help to steer child welfare activities into proper channels.

Requests have been sent to the National Child Welfare Division for a broad survey of child welfare activities in posts throughout the nation, so that as many ideas as possible for good programs can be gathered together and analyzed by the national office with regard to scope and cost. While it is not the function of the Academy liaison officers to originate child welfare programs, it is possible in an advisory capacity to suggest ideas. The Legion is most receptive to these suggestions.

Those members of the Academy who belong to the American Legion should offer themselves to their respective posts for advisory service on Child Welfare Committees. With a very small expenditure of time a great deal of good can thus be accomplished. Without any flag-waving intended, members of the Academy who were in the armed services should feel a special obligation to the children of the country, especially after having had a firsthand look at what improper guidance of youth produced in other nations.

Respectfully submitted,
JAMES G. HUGHES,
Chairman and Chief Liaison Officer

REPORT OF THE COMMITTEE ON COOPERATION WITH NON-MEDICAL GROUPS

The report of the Committee on Cooperation with Non-Medical Groups is necessarily short, as a new committee had to be organized and most of its work has been organizational since its appointment.

We have contacted the national headquarters of the Boy and Girl Scouts, the National Camping Association, and the P.T.A. in an effort to coordinate their child health work and that of the Academy, at both national and local levels. In order to carry this out better, a sub-committee member has been appointed in each state and in the larger cities for local contacts with these groups.

The Committee is still continuing to push the use of the camp card and the film "When Bobby Goes to School."

Respectfully submitted,

JAMES C. OVERALL, *Chairman*

REPORT OF THE COMMITTEE ON GOVERNMENTAL AND MEDICAL AGENCIES

The Committee held two meetings during 1947, the first at Pittsburgh in February and the second during the meeting of the A.M.A. at Atlantic City, which was attended by the Conference Committee from the A.M.A., the U.S.P.H.S., the Children's Bureau, and some invited participants.

At the Atlanta City meeting, many constructive ideas were presented by all four agencies which were compiled and forwarded to Dr. James Wilson's Committee for its consideration. The outstanding recommendation made by virtually all speakers from all four agencies was: that the Academy should, as a follow-through of the Study of Child Health Services, create an American Academy of Pediatrics continuing Roundtable Conference of cooperative effort on behalf of Better Child Health, in the Nation's Capital, with some full-time personnel, with at least the Academy, the A.M.A., the Children's Bureau, and U.S.P.H.S. participating. This hearty indorsement of our Academy's National (and State) Program for the Cooperation of Governmental and Medical Agencies for improved child health is most gratifying to all of us who have worked since 1934 for just this type of joint action.

At the Committee meeting in February at Pittsburgh, the Committee approved and sent to the Executive Board three recommendations as follows, (1) American Academy of Pediatrics National Child Health Conference setup, (2) national planning and standards of quality for good pediatric medical care for all children in the United States, and (3) particular consideration of the problem of pediatric medical care *in low income families*. It was also recommended that they create definite policy and machinery for the *reactivation* of Academy State Committees on Cooperation with Governmental and Medical Agencies at state levels by conversion of the present State Child Health Survey Committees, as suggested by Dr. John Hubbard.

These four important matters were referred by the Executive Board to Dr. Wilson's Committee on Improvement of Child Health for study and action, and it is the Committee's understanding that these four matters have been re-referred to the Executive Board for their disposition.

Undoubtedly the Executive Board and Dr. Sisson's and Dr. Wilson's Committees will provide entirely for these two essential national and state setups, but this report is recorded so that the Academy fellowship will understand the situation and continue their splendid support, and so that, upon the foundation groundwork of our Committee during the past twelve years, there may be erected this promising structure of good child health cooperation between medical and governmental agencies.

Respectfully submitted,

STANLEY NICHOLS, *Chairman*

REPORT OF THE COMMITTEE ON SCHOOL HEALTH

A House of Representatives hearing was held on the National School Health Service Bill (HR-1980) in July. The Chief of the Children's Bureau testified that under this bill much could

be done to discover and correct defects and conditions which interfere with the normal growth and development and educational progress of school children. The report of the hearing does not indicate clearly the criticisms of the bill that have been made by educators and by the medical profession.

The Executive Secretary of the American Public Health Association appeared in support of the bill, "pointing out the agreements and differences between this bill and the Association's statement of Principles of Medical Care," adopted October 4, 1944. Only one exception was made to those principles and this was concerned with the principle that "a single responsible agency is a fundamental requisite to effective administration at all levels," and the Executive Board of the Association authorized their representative to recommend a change (Section 6, line 12), "provide for the administration of the plan by a single state agency as the sole agency for the administration of the plan, provided that on or before January 1, 1950, such agency shall be the state health agency."

This testimony was considered by the Council of the School Health Section of the American Public Health Association at its meeting in Atlantic City in October, and it was pointed out that this recommendation could not win the support generally of educators because of the old question of jurisdiction between Education and Health Departments. This, it will be remembered, has been recognized by the American Academy of Pediatrics in numerous reports. A Committee of the School Health Section of A.P.H.A. was appointed to draft a statement of "principles for consideration in judging legislation designed to improve the health of children of school age," and to consult with the various interested agencies to determine the areas of agreement.

It was pointed out by the representative of the American Academy of Pediatrics that the unyielding positions taken by influential educators and public health workers concerning jurisdiction for administration could only bring confusion to the legislators and no such important questions should go to Congress while the interested professional agencies were quarreling over fundamental policies. It was also pointed out that the emphasis should be placed upon joint planning between the Departments of Education and Health as mentioned in the last report of your Committee on School Health of the Academy.

Another issue was concerned with medical care and treatment. Those who demand that the provision of medical care and treatment shall be without regard to economic status or ability to pay for private medical facilities apparently were as unyielding in their position as those who felt that safeguards are necessary in order to avoid doing away with private practice. Your Committee on School Health made clear in its last report that safeguards are essential if we are to avoid using up funds for treatment and medical care at the expense of the educational, case-finding, follow-up, guidance and diagnostic aspects of the program, therefore the demand for free treatment for all children is not practicable without danger of wrecking the remainder of the program. The basis of a compromise over this issue, so that provision can be made for funds for medical care and treatment for children where the need can be shown, may be found by the provisions already approved in Parts 1 and 2 of Title V of the Social Security Act.

Mr. George J. Hecht, publisher of *Parents' Magazine,* and Chairman of the National Committee Working for the Enactment of the National School Health Services Act, reports, at the time of writing this report, that the financial support of the Committee comes from a new organization called "The American Parents Committee Working for Better Conditions for Children—Locally and Nationally." This new organization hopes to raise $50,000 and lists eight different special committees for education, child health, and child welfare legislation. As H.R. 1980 sponsored by this organization was the only health bill that had a public hearing by the House of Representatives at the last session, the picture may be further complicated unless the professional agencies who are interested in school health legislation can get together before Congress is ready to consider such legislation.

In spite of the action of the Executive Board of the American Public Health Association for the hearing last July, it now seems possible that the principles being drafted by the Committee of the School Health Section of the A.P.H.A. may offer a basis for agreement upon federal school health legislation by educators, public health workers and the medical profession.

Another important step toward understanding and cooperation between educators, public health workers and the medical profession was taken at a conference sponsored by the American Medical Association at Hotel Moraine, Highland Park, Ill., October 16-18. This Conference was

divided into four discussion groups with representatives from State departments of education, State departments of health, State education associations, and State medical societies. Each discussion group rotated between the four sections on School Health Services, School Health Program and Studies, the Physician and Physical Education, and Preservice and In-service Education, with Conference consultants remaining as discussion leaders in the four sections. The exchange of view points in small groups and the agreements achieved by a wide variety of special school health workers offered an excellent demonstration of the kind of cooperative thinking and planning that is essential for improved school health programs.

Respectfully submitted,

HAROLD H. MITCHELL, *Chairman*

Standing Committees

REPORT OF THE COMMITTEE ON FETUS AND NEWBORN

As authorized by the Executive Board at its July 1947 meeting, the Chairman of the Committee on Fetus and Newborn has contacted the various State Chairmen requesting them to appoint State Committees on Fetus and Newborn to work with the Academy Committee in activating the program to improve newborn infant care. An index of the enthusiasm with which this program has been received is the fact that within two months of the original request thirty State Committees on Fetus and Newborn have been organized.

Your Committee is working on the preparation of a manual on the Hospital Care of Newborn Infants that may eventually warrant official Academy approval. The preliminary draft of such a manual has been assembled and over 160 copies submitted for suggestions and criticisms to all officers, State Chairmen and State Fetus and Newborn Committee Chairmen as well as to other interested groups and individuals both in and outside of the Academy. Within three weeks of mailing these brochures, 23 detailed studies of the material submitted were received—rich with valuable criticisms and suggestions. The Committee knows of a number of federal, state and local groups that are studying the program with a view toward submitting constructive suggestions.

Respectfully submitted,

STEWART H. CLIFFORD, *Chairman*

REPORT OF THE COMMITTEE ON MENTAL HEALTH

The motion picture "Problem Child" has been completed. Made possible by a grant from the Pet Milk Company, this picture discusses and demonstrates some of the characteristics and problems in the mental and physical aspects of growth and development.

A short pamphlet describing, in more detail, the factors which influence growth and development will be distributed to chairmen of lay audiences, with the approval of the Academy.

Respectfully submitted,

BERT I. BEVERLY, *Chairman*

REPORT OF THE PROGRAM COMMITTEE

The Program Committee submits the following recommendations for consideration by the Executive Board at this time.

1. The Program Committee shall consist of the Secretary; the Editor of the Academy's journal, PEDIATRICS; and the Assistant Secretary who shall act as chairman.

2. The Program Committee shall prepare the program for the Annual Meeting which shall be submitted to the Executive Board for approval not later than the Spring Meeting of the Executive Board.

3. In preparing the program the Committee shall divide the available time of the General Sessions approximately as follows:

One session—Business Meeting.

One session—Academy Awards and other papers.

One session—Report of a committee or committees. (To be selected by the Executive Board.)
Four sessions—Panels and Symposia.

4. Luncheons shall be sponsored by committees to be selected by the Executive Board.
5. Seminars and Round Tables to be a part of the program when feasible.
6. The programs for Areal Meetings to be primarily made up of individual papers.
7. Areal Meetings to emphasize clinics whenever possible.
8. Pediatricians who are not members of the Academy should be encouraged to attend Areal Meetings.
9. A registration fee for non-members shall be charged which shall be more than the fee charged members.

Respectfully submitted,
EDGAR E. MARTMER, *Chairman*

Special Committees

REPORT OF THE COMMITTEE ON GEOGRAPHICAL DISTRIBUTION OF PEDIATRICIANS

There are about eight requests for surveys. Some of these surveys are rather extensive. The Committee continues to revise old data which will be of value when the new A.M.A. directory comes off the press.

Respectfully submitted,
OTTO L. GOEHLE, *Chairman*

REPORT OF THE COMMITTEE FOR IMPROVEMENT OF CHILD HEALTH

Originally submitted to the Executive Board July 8, 1947
redrafted September by the ICH Committee.

This Committee is a fact-finding and analyzing body whose function is to investigate such matters as are referred to it by the Executive Board and to assist all other committees when so requested through the central office. The Committee from its own studies can initiate recommendations to the Board which the Board can then refer to the proper committee. It is understood that there may be frequent consultations between overlapping committees.

The first action of the Committee for Improvement of Child Health has been to define for your approval the scope of its responsibilities. It is assumed that you planned the Committee's function to be a broad one: To study all matters pertaining to child health and welfare, to collect and analyze data and opinions from many sources, particularly as revealed in the Academy's Study of Child Health Services, to furnish source material to specifically designated committees and to submit recommendations of policy for the consideration of the Executive Board.

In the Committee's deliberations it was repeatedly made clear that the Committee has no executive responsibilities except those necessary for the collection and interpretation of data and for the administration of other specific responsibilities which may from time to time be assigned to it by the Executive Board. Its primary function is to analyze matters involving Academy policy and to present to the Executive Board recommendations concerning such matters. It is recognized as essential that its deliberations or conclusions should be constantly transmitted to the Executive Board of the Academy through the Academy Secretary.

With the activities of the Academy being expanded to a more important position in the national field of child health, it must be clearly established that we are interested in the protection and improvement of the health of children. We must seek to instill in all interested individuals and organizations confidence that the American Academy of Pediatrics, as a branch of organized medicine, is seeking to meet adequately the problems of medical care in public health in its broadest sense.

In assuming the responsibilities which we feel will inevitably fall on this Committee, responsibilities which will increase as the public realizes that the Academy is willing to assume them, your Committee is acutely aware that if it is to avoid being overburdened with a load greater than it can carry successfully, close cooperation must exist between this Committee and standing and special committees of the Academy. It is evident that matters will arise from time to time which will require action beyond the scope of the committees already in existence. In such instances we feel that the Chairman of the Committee for Improvement of Child Health, after advice from the other members of the Committee, may request the President through the Secretary to appoint additional committees as may become necessary. It is also apparent that the volume of work will immediately become too great to be transacted effectively by any committee through its own activities. Therefore a full-time staff will become necessary, not only to give aid to the Committee for Improvement of Child Health but also to other committees of the Academy.

Objectives

1. *Study of Child Health Services:* The most immediate objective is obviously to study the information already being revealed by the Academy's Committee for the Study of Child Health Services and to make recommendations for the improvement of child health based upon this background of factual data now becoming available. A preliminary report of the Study of Child Health Services will be submitted to the Executive Board and the Academy at the Annual Meeting in December 1947. A complete and final report should be available by spring or early summer of 1948. This preliminary report should be a sufficiently reliable preview of the final report so that recommendations arising from the Study of Child Health Services may be formulated without waiting for the final report. The Study falls logically into four main divisions: hospitals, community health services, private practice and pediatric education. These four divisions might well be considered separately by appropriate Academy committees which could begin now to study the material and work toward the ultimate objective.

2. *Pediatric Education:* During the course of the current study of pediatric education, regional meetings have been attended by chiefs of the pediatric departments. In these meetings, expression has frequently been given to the thought that the chiefs of pediatric departments of approved medical schools should plan to meet regularly in order to interchange ideas and plan for the improvement of pediatric education in their respective schools and areas of the country. In view of the enhanced importance of this phase of the Academy's activities, we recommend that the President name a new Committee on Pediatric Education.

3. *Hospitals:* By virtue of currently developing planning for hospital construction under the Hospital Survey and Construction Act of 1946 (Hill-Burton Bill), this Committee recognized the urgency of studying plans for construction of new pediatric hospitals, pediatric units of general hospitals and newborn nurseries. It is recommended that the pertinent results of the study be referred for immediate action to the Committee on Hospitals and Dispensaries.

4. *Standards and Yardsticks for Child Health and Pediatric Education:* Your Committee recognizes the need of studying standards or yardsticks in all fields of child health services as shown by the Academy's current Study. Standards which have already been proposed by the American Hospital Association, the American Public Health Association, the Children's Bureau and the U. S. Public Health Service and others should be carefully studied to determine which are acceptable to the Academy.

Where suitable standards or yardsticks have not already been developed, selected items should be referred to appropriate committees for their consideration.

5. *Continuing Collection of Information:* The Academy has put itself in a position of great influence and authority, not only because it represents the greatest proportion of physicians especially trained in pediatrics, but also by virtue of having collected the most complete body of information regarding services and facilities for child health in the country. With rapid changes in all fields of public health and private practice, much of the data now being collected will soon become obsolete. Furthermore, the Academy's current Study will undoubtedly reveal many matters calling for further study and investigation; as for example, a more detailed analysis in the fields of rheumatic fever, poliomyelitis, care of the newborn, school health programs, mental health, pediatric education, pediatric nursing, etc.

Therefore, the process of gathering facts should be a continuing function of the Academy so that with an accumulating body of factual information which is kept alive and current, the Academy can maintain its influence in the improvement of child health and pediatric education.

6. *State Chairmen and State Committees:* One of the significant results of the Academy's Study with the states has been the appointment of active advisory committees by state chairmen. In many states, strong committees have been formed with representation not only from local pediatric groups but also state medical societies, state departments of health, dental societies, tuberculosis associations, crippled children's societies, local representatives of the National Foundation for Infantile Paralysis, welfare organizations, educational agencies and others concerned with the health and welfare of children. These committees constitute a most important outlet and should be stimulated by giving them continuing and increasing responsibilities so that the Academy will be represented at the state level. The Committee for Improvement of Child Health believes it should review the recommendations made in the state reports in order that information at the national level may be made available if desirable. In recognition of the variability of local conditions, it is understood that the function of this Committee is purely advisory in relation to recommendations contained in state reports.

7. *Federal Legislation:* It is becoming increasingly likely that as a result of the Study of Child Health Services, the Academy may wish to make recommendations through its officers and the Executive Board directed toward new legislation at either federal or state levels. Therefore, the Committee for Improvement of Child Health deems it important that they should be kept continually informed of current opinions, proposals, and activities developing within federal health agencies and congressional groups. The Executive Staff of the Committee, with the assistance of the Academy's standing Committee on Legislation should serve this purpose and make recommendations in such matters to the Executive Board for their consideration.

8. *Pediatric Nursing:* It is recognized that there are too few well trained nurses available for pediatric care. The Committee agrees that it must be greatly concerned with this problem of pediatric nursing care and take action when possible to improve the situation.

9. *Research:* It is obvious that there are many other opportunities where the Academy, functioning through its Committee with the assistance of a full-time staff, could be of great aid in many research projects which of necessity have to be conducted on a national scale but which so far have never been developed. The Academy could well concern itself with such matters and help in their organization and implementation.

10. *Publicity and Public Relations:* One of the essential functions of your Committee inevitably will be to aid the Executive Board to direct and control sound publicity and good public relations. It is apparent that, largely as a result of the Study of Child Health Services, the Academy is being closely observed by the profession at large, health services of the government, and by the public. It, therefore, behooves this Committee to be extraordinarily careful to consider all the best practices and ethics of medical publicity and to observe good taste in every move and every statement. Throughout the year when publicity matters cannot be brought directly or immediately to the Board, not only news releases but their implications should be carefully considered and approved by your Committee in order to protect the Executive Board and the Academy from undesirable interpretations of ill-considered or premature publicity. One of the first objectives of your Committee should be to promote a better understanding of the Academy's aims among pediatricians and other physicians. A careful publicity program can then and then only be developed to bring to the public at large, through recognized publicity channels, knowledge of accepted standards of good pediatric care and facilities currently available or to be developed for the improvement of child health. It is agreed by your Committee that a full-time director of publicity and public relations should serve on the executive staff of the committee.

Organization

1. Director
2. Associate Director, assigned specifically to pediatric education
3. Publicity and public relations counsel
4. An expert in statistical research and medical economics
5. Administrative Secretary
6. Assistant Secretaries and clerks

It was obvious to your Committee that the study of pediatric facilities carried out under the direction of Dr. John P. Hubbard has given him such a background of experience and such an opportunity to demonstrate his abilities that no other person could fill the position of director as satisfactorily. It is urged, therefore, that the Chairman of the Committee for the Improvement of Child Health be given authority to appoint Dr. John P. Hubbard as full-time director at a salary of $15,000 a year with the understanding that if he received other salary from the Academy or additional salary from academic appointments, his salary as director of the Committee would be reduced by that amount. The director should be given power to appoint other personnel as may be required to complete the staff as outlined above and to direct and manage the activities of the Committee under the Committee's immediate direction. It is clearly recognized that all activities of the Committee, the Executive Director and Executive Staff are subject to the approval of the Executive Board.

Budget

It is estimated that the Committee for Improvement of Child Health will require an initial budget of approximately $75,000 a year to cover salaries, publicity program, travel expenses for the staff and committee, committee meetings, office and operating expenses. Your Committee recognizes that these budgetary requirements are far beyond the present financial resources of the Academy and that active and immediate steps must be taken to obtain the necessary financial support.

Respectfully submitted,

JAMES L. WILSON, *Chairman*

SUPPLEMENTARY REPORT TO THE EXECUTIVE BOARD

Organization

1. At a full meeting of the Committee for Improvement of Child Health at Ann Arbor, Mich., on September 21-22, Dr. Wilson reported to the Committee that in accordance with the authority voted to him by the Executive Board on July 8 he had appointed Dr. John P. Hubbard as Director of the Executive Staff of the ICH Committee at a salary of $15,000 a year. It was agreed that if Dr. Hubbard should derive additional salary from academic sources his salary as Director of the ICH Committee would be reduced by that amount. Also in accordance with action of the Executive Board, Dr. Hubbard was empowered to direct and manage the affairs of the Committee and to appoint such other personnel as may be needed to complete the Executive Staff as set forth to the Executive Board on July 8 with the specific inclusion of Dr. John McK. Mitchell.

Budget

2. Dr. Sisson, as Chairman of the Committee on Study of Child Health Services, agreed that so long as the executive staff of the Study Committee continues, which will probably be until about July 1, 1948, the budget of the Study Committee would be able to meet the expenses of the ICH Committee with the exception of the items shown in the interim budget. Dr. Wilson recommended that the additional salary for Dr. Hubbard should be paid as of July 1, 1947, since he has really been serving the committee in the capacity as Director since this date, if not considerably before. It is anticipated that Dr. Mitchell may terminate his duties with the Study Committee on or about April 1, 1948. An item of $1,750 is therefore included as three months' salary for Dr. Mitchell at the rate of $7,000 a year on a half-time basis. It is estimated that the secretarial work involved for the ICH Committee will amount to $3,000 up to June 30, 1948. With other expenditures, including travel expenses for committee meetings and expenditures related to establishing an office in Philadelphia about April 1948, the total interim budget is $14,250. (See schedule attached) The $5,000 appropriation requested from the Academy will be applied against this interim budget.

3. After July 1, 1948, it is expected that the Study Committee and its executive staff will cease to exist. The budget of the ICH Committee will then have to include all of the expenses of its executive staff, most of which are now being covered by the Study Committee. During the following fiscal year (July 1, 1948 to June 30, 1949) it is estimated, as stated in the original report to the Executive Board, that the ICH Committee will require a budget of approximately $75,000 to cover salaries, publicity program, travel expenses for the staff and committee members, office and

operating expenses. This budget was reviewed by the Committee and was thought to be the best estimate that can be made now. However, it is considered unrealistic to submit a detailed and specific budget to the Executive Board at the present time. Until the plans of the ICH Committee are developed further and, particularly until funds are in hand or at least in sight, it is impossible to set forth a definitive budget.

Cooperation with Other Agencies

4. It is further recommended that steps be taken to maintain the cooperation already established with the U. S. Children's Bureau, the U. S. Public Health Service, the American Medical Association, and other medical organizations through the conduct of the Academy Study.

Relationship with Other Committees

5. There has been considerable confusion regarding the overlapping of activities and responsibilities, as proposed for the ICH Committee, with other committees of the Academy. This confusion has been apparent not only at the meetings of the Committee but also in letters received from members of the Executive Board. Already the committee has been asked by Dr. Hill and Dr. Grulee to undertake certain things which might fall within the range of duties of other committees. It is therefore recommended that in due course the Executive Board clarify the relationship of the ICH Committee with other committees.

Note: The Committee requested the Secretary-Treasurer to submit to the Executive Board two additional items of immediate importance. These have not been included in the above report since they have already been acted upon as notified by the following telegram sent to Dr. Hubbard by Dr. Grulee, September 23, 1947:

"EXECUTIVE BOARD UNANIMOUSLY APPROVES LOCATION OF EXECUTIVE OFFICE OF WILSON'S COMMITTEE AT PHILADELPHIA $5,000 CONTRIBUTION FROM ACADEMY ALSO APPROVED."

Recapitulation of Recommendations

Over and above action already taken by the Executive Board, the ICH Committee recommends:

1. That a new Committee on Pediatric Education be appointed. (See redrafted original report, paragraph 2)
2. That the Executive Board approve the interim budget attached to the supplementary report.
3. That in due course, the Executive Board clarify the relationship of the ICH Committee with other committees.

Interim Budget

Committee for Improvement of Child Health

	July 1, 1947 to June 30, 1948	
Salaries:		
Director	$ 3,000	
Associate Director (one-half time)	1,750	(3 months)
Publicity and Public Relations Counsel	———	
Expert in Statistical Research and Medical Economics	———	
Administrative Secretary	———	
Statistical Assistant, Editorial Assistant, Secretary	3,000	
Travel and Meetings	5,000	
Publicity	———	
Office Expenses	1,500	
Total	$14,250	

Respectfully submitted,

JAMES L. WILSON, *Chairman*
JOHN P. HUBBARD, *Director*

REPORT OF THE COMMITTEE ON MOTHERS' MILK BUREAUS

The Committee has been in informal contact through the past year. Its fundamental problem is the infrequency of breast-milk feeding now practiced in this country. Obviously the status of mothers' milk bureaus is merely one element in this larger problem. Obviously, also, the value of human milk for infant feeding needs re-study before the subject can be approached on a factual, non-emotional basis.

The Chairman of this Committee was, therefore, glad to be consulted by Dr. C. A. Aldrich in his survey made for a sub-committee of Maternal and Child Health of the National Research Council. Dr. Aldrich's report entitled, "The Advisability of Breast Feeding," appears in the December 6, 1947 issue of J.A.M.A., page 915.

As further steps in publicizing and clarifying the present and future position of breast-milk feeding, your Committee reports the following:

1. Presentation at the last Annual Meeting of the Academy (Pittsburgh, 1947) of a motion by which the Academy gave "its official endorsement and support to a national movement to encourage breast feeding of infants."

2. Plans for arrangement of a round table or panel discussion with representatives from obstetrics, obstetrical nursing, and pediatricians specially trained in the nutritional and psychologic aspects of infancy. Such a section could not be given a proper place on the program of the Dallas meeting. It is, therefore, planned to ask its inclusion in the 1948 Annual Meeting.

The work of the Committee on Mothers' Milk Bureaus will remain rather limited until a broad advance in breast feeding can be brought about in this country.

Respectfully submitted,

CLEMENT A. SMITH, *Chairman*

REPORT OF THE COMMITTEE ON NATIONAL DEFENSE

Summary of Activities of the Committee on National Defense in Connection with Examination of Children at the Reception Center, New York City

October 1, 1946 to September 30, 1947

I General Medical Examinations 778

II Tuberculin Tests 745
(Positive 468)
(Negative 227)

III Schick Tests 745
(Positive 107)
(Negative 584)
(Not read 54)

IV Number of X-ray examinations 617
(Tuberculosis follow up 18)
(Hospitalized 5)

V Wassermann tests 745
(Of these 5 were proven cases of syphilis)

Age Range—Infancy to 24 years—Majority Between 14 and 19 Years

Nationality of those examined:

Danzigers	3	Czechoslovakian	150
Bulgarian	1	Latvian	8
Polish	351	Roumanian	54
Estonian	7	Russian	7
Hungarian	106	Armenian	1
German	58	Italian	2
Austrian	8	French	1
		Lithuanian	33

Additional groups of children are still arriving in this country and examinations not included in this report are in progress.

Respectfully submitted,

CARL H. SMITH, *Chairman*

REPORT OF THE COMMITTEE ON POST-WAR COURSES IN PEDIATRICS

On November 8, 1947, 180 hospitals and institutions, accredited for training by the American Board of Pediatrics, were circularized for pediatric vacancies during the year 1948. Beginning December 1, 1947, a mimeographed list of these vacancies will be sent to each man on our list and each month thereafter we will try to get out a similar list. There are now 98 men on our list who are seeking pediatric residencies.

The results of the questionnaire which we sent out June 19, 1947, to all the men in our files were as follows:

No. of questionnaires sent	202
No. asking to be left on list	73
No. asking to be dropped from list	53
No. returned marked no address	20
No. unidentified	28

Respectfully submitted,

CLIFFORD G. GRULEE, *Administrator*
IRVINE MCQUARRIE, *Chairman*

REPORT OF THE COMMITTEE ON STUDY OF CHILD HEALTH SERVICES

Two years have now elapsed since the Study of Child Health Services emerged from the phase of preliminary planning into active operation. During this period the Academy Study has grown far beyond the anticipations of its most enthusiastic proponents. Now that its completion is in sight and its success assured we can state unhesitatingly that the reason for this success is the fact that it has had the support of the Academy membership, individually and collecively.

Many have wondered at the magnitude of this venture. Some have questioned if the breadth of its scope was really necessary. We could have done a much smaller survey at much less cost but then we would have failed in one of the purposes of the Study: to make information available in sufficient detail to be useful for local planning. At an early stage of our work we began to receive from State Chairmen demands for an analysis of the data for individual communities. This meant listing some of our data for each of the 3,000 counties of the United States and the 1,077 cities with 10,000 or more population. We have fortunately been able to keep pace with this demand, but we wish to make it clear that the growth in the magnitude of the Study has come from the membership up, rather than from your Committee down.

State Studies

We may now report with satisfaction that the collection of information from all States and Hawaii is complete. This means that throughout the entire Untied States information has been obtained from nearly all hospitals, mainly through personal visits. From the questionnaires which have been mailed to every physician and dentist in private practice in the United States, we have received a return of approximately 61%. From pediatricians the response has been 82%. We may consider this a very gratifying response, much higher than is usually expected from mail questionnaires. We have made an intensive survey of community health agencies, both official and voluntary, which render health services to children. This latter has been one of the most puzzling and difficult aspects of our Study since there is no central source of information for these agencies. Such an attempt has never before been made.

Reference to the attached financial statement will show that the total cost of State programs

has amounted to $433,072.18. Of this amount $167,805.63 has been contributed by county chapters of the National Foundation for Infantile Paralysis. (This is over and above the grant of $116,000 made by the National Foundation to the Academy for the budget of the Central Office of the Study.) If we include in the support received from State Health Departments, an estimate of the value of services as well as actual cash, their total contribution amounts to $104,488.69. Certain of the States have been unable to finance their own programs completely. In these States the Central Office has come to the rescue with cash advances of $36,086.01 plus services of field staff amounting to $4,325.78, making a total of $40,411.79, which has had to be met from the budget of the Central Office.

Study of Pediatric Education

All of the seventy medical schools and the major teaching hospitals in the United States have been visited. In order that the Study of Pediatric Education might, as originally planned, represent the combined opinion of Professors of Pediatrics and a member of our Central Staff, regional meetings have been held throughout the country attended by the Chiefs of Pediatric Departments. These meetings, of which there have been seven, have provided opportunity not only for discussion of the details of the Study but also for an interchange of ideas among those attending. Directly following these meetings the schools in the respective areas have been visited by Dr. Mitchell, assisted by his wife. Recently Dr. Mitchell has been assisted also by Dr. Martha Smith who has been loaned to the Study by Dr. Bain's Division in the Children's Bureau.

We are happy to report that the Study of Pediatric Education has been expanded to include the Canadian Schools. As agreed upon with the Canadian Society for the Study of Diseases in Children, Dr. Mitchell visited McGill and Toronto Universities in order to launch the Study in Canada. The remainder of nine Canadian medical schools will be studied by Dr. Ebbs and Dr. Silverthorne of Toronto. It is mutually understood that the expenses of the Canadian survey will be met from Canadian sources. We, however, are supplying the schedule forms and have agreed to undertake an analysis of the Canadian schools along with the analysis of the United States schools.

During last July, Dr. and Mrs. Mitchell spent several weeks in Washington with others of the Executive Staff of the Study Committee in order to outline the analysis of the information collected from medical schools and teaching hospitals. The seven area captains, who have been responsible for conducting the survey in their various parts of the country, met in Washington on November 6 and 7 in order to review the table forms which had been prepared in our Central Office. This meeting which was attended also by Dr. Johnston, as Chairman of the Committee on Undergraduate Education, afforded an opportunity not only for detailed discussion related to reporting this part of the Study but also for an interchange of ideas in relation to many problems in pediatric education already being discussed by the Committee for the Improvement of Child Health.

Reporting the Study

At the state level, plans are progressing for the preparation of State reports. Many State Chairmen have appointed one or more individuals to help in the writing of their state reports. Several State Chairmen, following advice from the Central Office of the Study, have designated specially qualified individuals to undertake writing up separately the three major parts of the report: hospitals, private practice, and community health agencies.

We wish to call to your attention the fact that the Central Office of the Study is receiving an increasing number of requests from State Chairmen for advice and guidance in the preparation of state reports. It is recognized by all that the writing of the state reports is a responsibility of the State Chairmen, a responsibility which must be obviously fulfilled at the state level. However, if these state reports are to attain full value, consultant help will be needed by many State Chairmen. No provision has been made for such service. We submit that this is a matter which should be given serious consideration by the Executive Board.

The report of Child Health Services in North Carolina, our pilot study, is now in final form and being submitted for publication in the *Journal of the North Carolina Medical Society*. The preliminary draft which was prepared in the Central Office with the exception of recommendations and summary, was carefully studied by the North Carolina Study Committee and a concise statement of recommendations included. The data related to dental services have been deleted since a separate report will be written by the North Carolina Dental Society.

In accordance with popular demand an abbreviated North Carolina report is being prepared for public consumption. This will be ready for distribution upon release of the technical report.

At the national level preliminary arrangements have been made with the Editor-in-Chief of PEDIATRICS for publication of the national report as a special supplement. Preliminary discussions have also been held with Mr. Thomas, the publisher, who is in accord with this plan. It is anticipated that the final national report should be ready for publication by early summer of 1948. Publishing the report in PEDIATRICS is considered a very favorable procedure since it will assure immediate distribution to all members of the Academy and assure also that the report will have a permanent place in medical literature. It is anticipated that an additional number of reports will be available as reprints, possibly bound in cloth, for distribution to others outside the circulation of PEDIATRICS. In addition to this report in PEDIATRICS which will not attempt to be comprehensive, or include all the material, supplementary detailed data will be reported so as to be available to all those who wish to dig more deeply into the data.

As a preview of the national report an analysis has been made of the information collected from a sample of eight states. These states have been selected with considerable care in an attempt to obtain an approximate sample of the country as a whole. Total volume of medical care in these eight states will be reported briefly at the Annual Meeting. A second paper to be presented at the Annual Meeting will describe private practice of pediatricians and general practitioners. A third paper will review preliminary findings of the Study of Pediatric Education. Arrangements have been made to have these three papers published in early, successive issues of PEDIATRICS.

Special Study on a Sample of Physicians

In order to obtain estimates of the total number of visits to physicians and dentists, including those who did not send in the mail questionnaires, a special survey was conducted in New York, Illinois, Mississippi, and Oregon on a sample of physicians and dentists in private practice. This survey had as secondary purposes the checking of the validity of the data received from the mail questionnaire and the provision of further information on well child services rendered in private practice.

As a result, factors which could be used to estimate the amount of practice of the group of physicians and dentists who did not report on the original study, in comparison with those who did report, have been established and will be used in preparing tables for the states. Some results of the survey raise questions as to the rate of services for children reported in the original study, especially for infants and the proportion of visits for well-child supervision. These points are being studied further.

Statistical Analysis

The analysis of the enormous mass of data now available has proceeded at a rapid pace. Editing and coding of the data from the States, which started last March, is now nearly complete. We have already sent out tabulated data to a number of the States. State tables will continue to flow out to the States in increasing volume so that all States should have received their tables in another few months. The information collected from our survey of medical schools is now undergoing hand tabulation. An additional item which has been completed by the statistical staff is a study of seasonal variations analyzed from data from the Committee on the Cost of Medical Care, and information from a number of pediatricians who have reported to us the volume of their daily practice over a period of one year or longer. We have also undertaken an estimate of child population as of July, 1945, for each county in the United States and for towns in four of the New England States. This has been done in order to bring information on child population up to date since the last U. S. census in 1940.

This volume of work has required a staff, the administration of which has in itself been a heavy responsibility. Last summer, during the course of the Sampling Study, our full-time Staff in the Central Office and in the field reached a peak of 165.

Publicity and Public Relations

While the publicity attendant upon the announcement of the national findings will prove colorful and exciting, the present period leading up to the publication of the national report is one of quiet preparation and cultivation. It is this current phase, the period preparatory to the release

of the findings, that is perhaps the most difficult one from a publicity and public relations point of view.

The magnitude of the Study and its implications are not fully realized by the profession as a whole, or even by our own Academy membership. Emphasis, therefore, has been given first to acquainting the Academy with the magnitude and significance of its own project. This has required close integration of Mr. Hiller's activities with the activities and ideas of the Academy's officers, the Study Committee and the ICH Committee. It has been a period of quiet cultivation of the profession looking toward education of the public. Among important current moves are continuing announcements of the progress of the Study through the medium of our Progress Bulletin, the circulation of which has been extended to reach not only all pediatricians who responded to our questionnaires but also leading laymen interested in health and welfare of children; past and prospective donors both foundation and commercial, as well as organizations such as the National Conference of Mothers Clubs, the American Legion, and PTA National Headquarters. The circulation of this Bulletin now approaches 6,000. In addition, occasional news releases, speeches and a radio program announcing the progress of the Study and details incidental thereto have been and are being disseminated through national and local media.

Another important function of the present phase has been not only to prepare for future magazine articles, but to prepare stories and exhibits for current consumption. Specifically, an article on the Study is in the hands of the *New York Times Sunday Magazine*. Also, much careful preparation has gone into an article to be written by an outside author, which will appear in one of the leading national women's magazines in February. It is inevitable that early in the new year there will be an outbreak of magazine articles on child health. While these have been prepared by outside authors over whom we have no direct control, we have endeavored to have the Study and the new program properly interpreted in those to appear in *The Woman's Home Companion* and *Coronet*. We have also interested *Fortune* magazine who plan an article late in 1948.

Finances

The attached financial statement, certified by Public Accountant, shows that as of November 1, 1947, the cost of the Study of Child Health Services has added up to a total of $870,509.58. Of this total $392,660.39 has been met by State Chairmen for the expenses of state studies; $390,513.06 represents expenses from the Central Office. The value of services and office space contributed by the Public Health Service is $57,550.01, by the Children's bureau $29,786.12, from July 1, 1945 to October 31, 1947. We are still indebted to the Children's Bureau for the continuing services of three persons on a full-time basis, Drs. Bain and Smith and Mrs. Ellis. We are indebted to the Public Health Service for the full-time assistance of two persons, Mrs. Pennell and Miss Cawley, and office space for one coding unit and our tabulating unit.

On August 18, 1947, we received $102,850.00 from the National Institute of Health for the further cost of statistical analysis for the fiscal year July 1, 1947 to June 30, 1948. This is the final payment of their two-year grant, the total of which is $231,400.00.

As shown in the attached statement, the cost of the sampling study has been $57,071.13. The cost of this study is being met by cash received or commitments made by State Health Departments.

We now have a balance of funds of $120,912.78 on hand, plus an additional amount of $32,585.00 due from State Health Departments on Sampling Study Contracts, making total funds available of $153,497.78 to cover the costs for the completion of the Study. We anticipate that the office of the study should close by July 1, 1948. On the basis of this assumption, the study will continue for eight months from the date of this report (November 1, 1947).

During recent months our expenses have run somewhat over $20,000 a month. During ensuing months our operating expenses should be somewhat reduced due to the fact that most of the statistical coding has already been done and our staff therefore can be reduced in number.

In the grant received from the National Institute of Health, we sustained a cut along with all other grantees of 15%, or $18,150. This has necessitated some revision of our budget and an increased load on our staff, some of whom have been doing double duty because of this cut. However, we are now endeavoring to complete the study by the deadline date and are hopeful that the remaining funds will cover the necessary costs.

Respectfully submitted,

JOHN P. HUBBARD, *Director*
WARREN R. SISSON, *Chairman*

Exhibit "A"

STUDY OF CHILD HEALTH SERVICES

Statements of Receipts and Disbursements
February 1, 1946 to October 31, 1947

Receipts		
Restricted Contributions:		
National Foundation for Infantile Paralysis	$116,000.00	
National Institute of Health	231,400.00	
Field Foundation	10,000.00	
New York State Health Department	10,500.00	
Illinois State Health Department	10,500.00	
Unrestricted Contributions:		
American Academy of Pediatrics	16,022.16	
Mead Johnson & Company	25,503.68	
M & R Dietetic Laboratories, Inc.	20,000.00	
Carnation Company	20,000.00	
Pet Milk Company	20,000.00	
New England Pediatric Society	500.00	
Lederle Laboratories	10,000.00	
Cutter Laboratories	500.00	
Mennen Company	500.00	
The Borden Company	10,000.00	
National Dairy Products Corporation	10,000.00	
Total Receipts		$511,425.84
Disbursements		
Salaries	$180,188.55	
Travel	24,433.48	
Furniture, Fixtures & Equipment	11,877.34	
Postage	3,380.28	
Office Supplies & Expense	5,340.22	
Printing & Publicity	14,241.43	
Telephone & Telegraph	3,462.08	
Periodicals & Books	248.24	
Car Purchase, Upkeep & Travel by Car	2,873.00	
Miscellaneous	366.66	
Accounting & Legal	2,400.00	
Insurance & Bonds	993.08	
Rent	13,300.00	
Machine Rentals	5,923.59	
Heat, Light & Water	1,262.61	
State Programs	40,411.79	
Sampling Study	57,071.13	
Educational Study:		
Salaries	12,599.12	
Travel	10,140.46	
Total Disbursements		390,513.06
Balance		$120,912.78

Exhibit "B"

Statement Showing Reconciliation of Accounts

October 31, 1947

Cash in Banks		
Foundation Account	$ 17,548.83	
NIH Account	76,197.93	
Academy Account	29,750.77	
Total Cash in Banks		$123,497.53
Credits		
Balance Available for Expenditure, Exhibit "A"	$120,912.78	
Income Taxes Withheld from Salaries	2,284.75	
Special Fund—Paid to Dr. Hill by Lederle Laboratories	300.00	
Total Credits		$123,497.53

NOTE: There remains due from state health departments on Sampling Study contracts the amount of $32,585.

Schedule—I—Cost of State Studies

Source of Funds:		
National Foundation for Infantile Paralysis	$167,805.63	
State Health Departments	104,488.69	
Central Office—Advances	36,086.01	
Central Office—Salaries & travel by field staff	4,325.78	
Others	120,366.07	
Total Cost of State Studies		$433,072.18

Schedule—II—Total Estimated Cost of the Study of Child Health Services

Central Office, spent to date	$390,513.06	
State Studies (omitting advances and costs of the central office which are included by the central office figure)	392,660.39	
Estimated value of services rendered by the United States Public Health Service from 7/1/45 to 10/31/47	57,550.01	
Estimated value of services rendered by the U. S. Children's Bureau from 7/1/45 to 10/31/47	29,786.12	
Total Cost of Study to Date		$870,509.58
Add: Cash in bank available for expenditure plus commitments from state health departments		153,497.78
Total Estimated Cost of Study		$1,024,007.36

REPORT OF THE COMMITTEE ON TUMOR REGISTRY

A conference of the Committee members in New York was held October 24, 1947.

The following physicians were appointed as consulting members of the Committee: Dr. Charles A. Waltman, Easton, Pa.; Dr. William G. Heeks, North Adams, Mass.; Dr. John M. Kenney, Santa Rosa, Calif.; Dr. James P. Simonds, Chicago, Ill.

To date the Tumor Registry has distributed approximately four thousand Children's Tumor Registry pamphlets to health officers, public health organizations, and private physicians. The sta-

tistical data and photographs have been used at the following meetings since the last report was made: American Medical Association and Fifth International Congress on Pediatrics.

This material has also been used for teaching purposes at the University of Utah School of Medicine, and Baylor University School of Medicine. It has been shown at several lay meetings by physicians and laymen interested in child health education.

In the preparation of educational lectures for national use the American Cancer Society will include a special series on the subject of cancer in childhood. The Children's Tumor Registry will supply data for this.

Respectfully submitted,
HAROLD W. DARGEON, *Chairman*

REPORT OF THE NOMINATING COMMITTEE

Recommendations:

For Vice-President (President-elect):
Dr. Warren R. Sisson, Boston, Mass.
For District Chairmen:
District I—Dr. Oliver L. Stringfield, Stamford, Conn.
District IV—Dr. Hugh J. Davis, Washington, D.C.
District VII—Dr. Thomas J. McElhenney, Austin, Tex.

Respectfully submitted,
JAMES M. BATY, *Chairman*

THE AMERICAN BOARD OF PEDIATRICS, INC.

Since our last report, examinations have been held in Cincinnati, Boston, Chicago and Buffalo. A total of 228 candidates were examined. Of these 172 passed. A total of 32 have been certified in the sub-specialty of pediatric allergy.

Examinations are now being held here in Dallas, and further ones will be given in Philadelphia —January 9, 10 and 11, and in Cleveland—April 23, 24 and 25. An examination will be held somewhere on the West Coast in the summer or early fall of 1948. In keeping with the policy of the Board to hold examinations at the time of the Academy meetings, it is probable that the West Coast examination will be held in Seattle immediately preceding the Academy meeting of District VIII in that city in September.

Because of the large number of inquiries concerning the Board's requirements for examination for certification, they are repeated here:

1. Graduate from a Class A Medical School.
2. One year of rotating or one year of pediatric internship in an approved hospital.
3. Two years of specialized residency-type training in an approved pediatric center.

   On May 1, 1946, it was ruled that at least one of the two years of required residency training must be a full-time pediatric residency, or internship in an approved institution. Because of the shortage of residencies, the Board at this time voted that temporarily the second year of required residency training might be met in the ways listed below, although the Board recommends that whenever possible candidates complete the two years as regular residents:

   (a) A full-time academic post-graduate course of nine months in an approved pediatric center is credited for one year's work.
   (b) Shorter post-graduate courses of three to four months' duration must add up to a full year.
   (c) A maximum of three months' credit each is allowed for full-time residency type training in allied pediatric subjects, such as pediatric allergy, pediatric psychiatry, pediatric pathology, pediatric cardiology, new-born service, etc.
   (d) A maximum of six months' credit is allowed for residency training in an approved contagious disease hospital.
4. An additional term of two years of specialized study and/or practice. Credit of one year toward this requirement is allowed for military service.

5. Preceptorships are not accepted for credit toward the residency requirement, but are accepted toward the practice requirement.

The Board defines service in a pediatric center as full-time devoted to rounded experience in an approved hospital which includes ward and out-patient service, experience with new-born including prematures and both therapeutic and preventive pediatrics. It is expected also, that the service will include adequate graduate training in the basic medical sciences, as well as in the clinical laboratory and public health aspects of the specialty. The time served in pediatric centers need not be continuous or spent in the same institution.

The application fee is $125.00 and must be remitted with the application. Refund will be made only if the applicant is refused an examination. Applicants who failed in an examination may apply for a second examination after two years have elapsed and the candidates have presented evidence of continued study and activity in pediatrics. The fee for a second examination is $75.00.

The term of Dr. Harold C. Stuart of Boston ended in June—1947. His successor will be appointed shortly.

Respectfully submitted,

LEE FORREST HILL, *Secretary-Treasurer*

REPORT OF "PEDIATRICS"

Official Journal of the American Academy of Pediatrics

Plans for the inauguration of PEDIATRICS, the official journal of the Academy, are moving satisfactorily and according to schedule. The first issue will appear in January of 1948 and will be published monthly thereafter. At the first annual meeting of the Editorial Board in Chicago on October 26, all final details were discussed and agreed upon. The format of the journal was also decided on with Mr. Thomas; and most of the material is now in the hands of the printer.

An entire division of PEDIATRICS will be devoted to the Proceedings of the Academy meetings including material presented at the various meetings. Part of this will be papers given on the scientific programs which should have high priority for publication in the division assigned to Original Articles. The selection and arrangement of all this material for the program and for the awards should be made in part with its suitability for publication in mind. It is requested, therefore, that the personnel of the Program Committee and the Committee on Awards be arranged so that a member of the Editorial Board is included to represent PEDIATRICS in so far as subjects which will come up for eventual publication should be considered.

The Executive Board is requested to confirm the appointments of Dr. John P. Hubbard and Dr. Leona Baumgartner as Contributing Editors and Mrs. Dorothy T. Darr as Executive Secretary of the Editorial Board. It is planned to appoint other contributing editors in the future when the need arises.

A budget for operating through 1948 has been prepared, examined and approved. It is based on a conservative estimate of income and expenditures during this period. This budget is based on a calendar year; whereas, the budget for the Academy is on a July to July basis. The prospects at present are that PEDIATRICS will prove a financial asset to the Academy from the beginning.

PEDIATRICS will consist of four major divisions: I. Original Articles; II. Academy Proceedings and Reports; III. Special Feature Sections; and IV. Advertising. Special efforts are being made to have individual fellows of the Academy assist in securing advertising and promoting this division. It is hoped, thereby, that a close relationship can be established among the Academy as a whole and as individual members, commercial exhibitors at its meetings, and this division of PEDIATRICS.

Full reports of all meetings of the Academy will be published. The January number of PEDIATRICS each year will carry as much of the material from the Annual Meetings as will be ready for publication. Since the areal meetings are devoted chiefly to scientific papers, these will be published in abstract except when an author wishes his paper to be considered as an Original Article.

This division will include reports from the Committee on Study of Child Health Services and the Committee on Pediatric Education. Plans are being worked out for the publication of the final report from the Study of Child Health Services as a supplement in separate book form.

Proceedings of the first annual meeting of the Editorial Board are available for review by members on request to the Secretary of the Academy or to the Editor-in-Chief.

A close working relationship has been established between the Editorial Board and the Publication Committee. The Executive Board may be assured of the most careful and enthusiastic cooperation of Charles C Thomas, Publisher, and George Banta, Printer. Members of the Editorial Board are conscious of the support and guidance emanating from these sources in inaugurating this important and difficult project of the Academy.

Respectfully submitted,

HUGH MCCULLOCH,
Editor-in-Chief

Standing Committee

REPORT OF THE COMMITTEE ON LEGISLATION

During the year 1947, several bills concerning health, possible regrouping of health agencies in the Federal government, maternal and child health services and school health services were introduced in the Congress, some having been considered by hearings before the various committees to which they were referred. No action was taken by the Congress itself before the summer adjournment so that these various measures remain in status quo, but are officially before the 80th Congress for possible subsequent action.

The perennial Wagner-Murray-Dingell bill appeared in its 1947 edition as S.1320 and was considered by the Senate Committee on Labor and Public Welfare together with the Taft-Ball-Smith-Donnell bill, S.545. Neither bill has been reported out of committee.

Senator Claude Pepper in July, 1947, introduced his new maternal and child health measure which likewise remains dormant.

The school health services bill (S.1290 and H.R.1980), for the extension of school health services under appropriations disbursed by the Children's Bureau has been considered in committee hearings but as yet remains unreported.

With the convening of the Congress in regular session in January 1948, there will no doubt be an increase in activity toward the adoption of some form of health legislation.

The Committee on Legislation heartily endorses the action of the Editorial Board of PEDIATRICS in making available to the Fellows of the Academy matters in which they not only have a lively interest but in which they also may have a State-wide opportunity to influence legislation favorable to the improvement of child health.

Respectfully submitted,

JOSEPH S. WALL, *Chairman*

Reports were not received from the following committees: Committee on Contact Infections, Committee on Hospitals and Dispensaries, Committee on Medical Education, Committee on Pan-American Scholarships; Committee on Rheumatic Fever, Committee on Cooperation with U. S. Food & Drug Administration, Committee on Nutrition, and Publication Committee.

SIXTEENTH ANNUAL MEETING AMERICAN ACADEMY OF PEDIATRICS

BUSINESS SESSION—PRESIDENT LEE FORREST HILL PRESIDING

Dr. Poncher: Dr. Davison, Chairman of the Committee on Awards is unable to be present so the awards will be presented by individual members of the committee. The first Mead Johnson Award will be presented by Dr. Waldo E. Nelson.

Dr. Nelson: Mr. President, Dr. Poncher, members of the Academy. The first Mead Johnson Award for the year 1947 has been made for work in the field of pediatric cardiology. While the specific and immediate factor responsible for the decision of your Committee was the development of a surgical method for the correction of a congenital malformation of the great blood vessels, there were other features which lent support and confidence in the selection of this candidate. The recipient has attained a place of prominence and authority in the field of cardiology and of rheumatic fever. Her influence in this phase of pediatric activity has come to be a substantial one. It is my privilege to announce that this Award has been made to Dr. Helen B. Taussig of Baltimore. Dr. Vivian Tappan, a long-time associate and friend of Dr. Taussig, will accept the Award for her.

Dr. Tappan: I need not tell you how much I regret that illness, fortunately not too serious, has led to Dr. Taussig's absence today, for I, as one of you, had looked forward to hearing her discuss some new phase of congenital cardiology. It is with awareness of the truly great contribution which Dr. Taussig has made in pediatric cardiology that I shall now read her paper—"The Tetralogy of Fallot—Indications for Operation and the Care for the Cyanotic Infant." (Manuscript to be published as an original article.)

Dr. Henry G. Poncher: It is my privilege to announce the recipient of the second Mead Johnson Award. This has been made to Dr. Louis K. Diamond of Boston because of his outstanding contributions to the field of pediatric hematology. Under the stimulus of Dr. Kenneth Blackfan one of the first pediatric clinics devoted exclusively to hematology was started at the Children's Hospital in Boston. From this clinic and through the stimulus of Dr. Diamond has come the continued interest in pediatric hematology and improved understanding and knowledge of the disturbance of the blood forming organs. Not only has Dr. Diamond made numerous contributions to the field of pediatric hematology, but his work particularly in hemolytic disease in the new born has been outstanding. More than fifteen years ago attention was called to the varying clinical forms of erythroblastosis fetalis. A further development of this has been the study in the Rh factor and the methods of diagnosis and treatment of this condition. Dr. Diamond's work has been particularly significant in those conditions resulting from iso-immunization.

Dr. Diamond: Mr. President, Dr. Poncher, members of the Academy, I am duly appreciative of the honor for the second Mead Johnson Award paid to me and through me to our clinic in recognition of the many years of effort in the field of pediatric hematology. It is neither oriental self-depreciation nor merely becoming modesty on my part—it is plain sole credit for any contributions we have made. Even this specialty within a specialty has grown too large for a single person. There is ample room for many contributors and only by their full cooperation will our knowledge advance through the efforts of those contributors. In our own clinic I have had many associates in the past two decades and I wish to acknowledge my debt to all of them, and particularly to my recent coworkers, Drs. Abelson, Allen, Thomas and others. Since it is impossible to review more than a small part of our work, I have chosen a subject which is still controversial, but is of considerable interest. This is, "The Value of Replacement Transfusion as a Treatment for Erythroblastotic Pathology," and I wish to summarize our results from the use of a plastic catheter in the umbilical vein. (Manuscript to be published as an original article.)

Dr. Poncher: The Borden Award will be presented by Dr. Francis Scott Smyth of San Francisco.

Dr. Smyth: Mr. President, Dr. Grover Powers has been recommended for the Borden Award for his outstanding contributions to our knowledge of infant feeding and the nutrition of children. No detailed documentation of these publications is needed for this audience. Those reports give only the scientific aspect to a contribution which comes from sustained observation, the increment of time, the perspective of maturation and the harvest of mellowing years. Graduating from Johns Hopkins in 1913 Dr. Powers inherits the spirit of teaching and research emanating from Osler,

Mall, Howland, and Welch. At Harriet Lane Home in Baltimore, in Detroit and in New Haven he has continued his concern with the problem of infant feeding and nutrition. But, equally important for the scientific aspect he has felt the strong social implications of our professional responsibility. A strong champion of social justice, he has not chosen cloistered isolation nor philosophic inanition. Few of our profession have so touched the many facets of our professional life, have watched the growth and felt the pulse of pediatrics. From his educational altar have been lighted the fires of a hundred circling candles; identified with Yale he belongs to all of us. Stimulating educator, wise counselor, gentle friend, Dr. Grover Powers.

Dr. Powers: Mr. President, Dr. Poncher, Dr. Smyth, fellow pediatricians, I am greatly honored in being the recipient of the Borden Award of the American Academy of Pediatrics. It is accepted as a tribute to the fine women and men who have worked with me as friends and colleagues in the field of child health and welfare during the past 35 years. I wish to express our thanks for this distinction and the generous remarks of Dr. Smyth. The title of my remarks is "Some Observations on the Feeding of Premature Infants" based on 30 years of experience at the New Haven Hospital. (Manuscript appears in this issue's Original Articles Division.)

President Hill: The next item is the address by the President, and I should like to speak on "The American Academy of Pediatrics, its Growth and Development." (Published January 1948.)

President Hill: The first matter on the agenda for the Business Session is the Report of the Executive Board. (Published this issue.)

Dr. Martmer read the names of the applicants who have been approved for membership. (See Report of Executive Board.) The applicants were elected to membership.

Emeritus Fellowships were granted and resignations were accepted. (See Report of Executive Board.)

President Hill: There are certain items in the committee reports to which we would call your attention. Action by the Academy is necessary upon the recommendation regarding affiliates. The Board recommends that there shall be a class of membership known as "Affiliate Fellows" consisting of surgeons, pathologists, bacteriologists and virologists, roentgenologists and psychiatrists. The above was moved, seconded and carried.

The Executive Board recommends that Article 4, Section 1, Paragraph E, of the by-laws be amended to read as follows: "In the United States a Candidate must have been certified by the American Board of Pediatrics before being eligible for Fellowship in the Academy, and in Canada, a Candidate must have been certified either by the American Board of Pediatrics or the Board of Pediatrics of the Royal College of Physicians and Surgeons in Canada." It was moved, seconded and carried that the change in the by-laws be accepted.

The function of the Committee for Improvement of Child Health was defined. (See Executive Board Report.) The purpose of this was to smooth a way of procedure for committee action within the Academy.

We'd like your action now to approve that Roberts' Rules of Order shall be our Official Guide. This motion was moved, seconded and carried.

The report of the Committee on a Library and Museum was adopted.

It is in order that the membership approve the Reports of the Executive Board as a whole, unless there are some individual items which you would like to discuss. It was then moved and seconded that the Report be accepted as a whole. Motion was carried.

We have in our membership a man who has been Chairman of one of our important committees for a long time. He has indicated that he must retire as the Chairman of that Committee. It would be most fitting if we asked him to make his final report as Chairman of the Legislative Committee. Dr. Joseph Wall read the report of the Legislative Committee. (See Report of the Executive Board.)

Thank you very much Dr. Wall. Most of you know that Dr. Wall had a very serious illness and we're delighted that he is able to be at this meeting. Dr. Lancaster, Chairman of the Publications Committee, has a request.

Dr. Lancaster: Mr. President, fellow members, we've been asked the question many times, "Why the Journal under the control of the Academy?" If you go back to the beginning of the Academy with a small membership, it was not physically or financially possible to have its own journal. The present setup is different. The Academy has grown to the point where it can have its own journal and it will be owned, edited, financed and directed by the Academy. Any profit accruing will go to the Academy.

The Editorial Board, The Publication Committee, and Charles C Thomas, Publisher, will all collaborate to make this an outstanding periodical and promote its circulation. Through your State Chairman you will be contacted further in regard to this and the means and methods by which you can help us. Your full support is needed and it is the hope of the Committee that you will cooperate willingly and enthusiastically in the endeavor to put over this new project.

The Executive Board has referred to the Publication Committee the problem of publishing the history of the Academy as written by our historian, Dr. Marshall C. Pease. This is one of two volumes in the original form, with notes and comments, and is a complete history of the Academy from its inception. The actual value of these two volumes cannot be estimated and the value of these original volumes will increase with each year. To insure against possible accident, the Committee recommends first, that a microfilm of these volumes be made at once. Second, that these volumes be edited and prepared for publication, and for such duty, the Publication Committee recommends further that a committee of not less than three members be appointed and that proper appropriation be voted to complete this work.

President Hill: The Executive Board has recommended that congratulations be sent to Dr. Isaac A. Abt of Chicago who will be 80 years old on December 18.

Dr. Martmer reported names of Academy fellows who died during the past year. (See Executive Board Report.)

It was moved, seconded and carried that the annual dues for the coming year will be $30.00—$20.00 for dues and $10.00 for the subscription to the journal.

President Hill: Last evening the State Chairman had an excellent dinner and a most scintillating discussion afterwards. Dr. Park J. White is going to tell us one or two of the things that came out of that meeting.

Dr. White: The State Chairmen met until 12:00 o'clock. There was some discussion, appropriately enough, about the subject of democracy within the confines of the Academy. Naturally this emanated from that fountainhead of democracy, Massachusetts. It was resolved that the State Chairmen recommend that a special committee be appointed by the President to study the Constitution and By-laws of the Academy and make suggestions for such changes as may seem indicated. The following suggestions are specifically recommended for the consideration of such a committee:

1. Formal organization of the members in states where there are ten or more members. Election, rather than appointment of the chairman of each state, district, province or Latin-American country, in areas where there are ten or more members.

2. Limiting the term of office of the State Chairman. That already exists, but in many states it is expedient to continue the State Chairman in office as nothing better can be done.

3. Election of the District Chairman and the Alternate District Chairman by the membership of the district, rather than by the membership of the entire Academy.

4. The establishment of a council or assembly to consist of the State Chairmen and the District Chairman.

Dr. Hill has stated that members of the Committee will be appointed and consideration will be given to the suggestions. Then the State Chairmen took an inevitable action. The State Chairmen have had much to do with the preparation of reports of the Study and will have to get the reports together. They, of all people, are the ones who should heartily approve the ICH Committee. They went further than that. They agreed to assess themselves $10.00 each as a starter to carry on the work of the ICH Committee.

President Hill: Thank you very much, Dr. White. Obviously the work of the ICH Committee would be greatly advanced if there were an assessment adopted for the membership as a whole but it is our feeling that we should know more about the ICH Committee and that it might be better to wait for an assessment of this sort. In the meantime, we hope that you will be willing to make voluntary contributions as did the State Chairmen at their meeting last evening.

The matter of future meeting dates should come to your attention. Because of the rapid growth of the Academy, it is becoming an increasing problem to find a suitable meeting place. The hotel situation is growing more difficult and as a consequence the Executive Board has authorized the Secretary-Treasurer to arrange for annual meetings for a period not to exceed five years in advance. At the present time such meetings have been arranged for the coming three annual meetings, and there are also six area meetings which have been arranged.

A request has come in for a representative of the Academy to attend a Child's Congress at Caracas, Venezuela.

Miss Lenroot, Chief, U. S. Children's Bureau, has requested also the appointment of someone to be on the Planning Committee in Washington at once. About the only voluntary medical group in the conference is the Academy. If the Academy does not take advantage of this opportunity, probably some other group which represents less the children of this country will be asked.

I should like to entertain a motion that the Academy select as its representative, its Secretary, Dr. Clifford G. Grulee, to attend this meeting in Venezuela. This motion was made, seconded and carried.

Dr. McCulloch has an announcement he would like to make about PEDIATRICS. (See Executive Board Report.)

President Hill: Thank you, Dr. McCulloch. We're all looking forward to seeing the new journal when it makes its appearance. Dr. Martmer has some resolutions to read to you.

Dr. Martmer read the following resolutions which were moved, seconded and adopted: Be it resolved that the American Academy of Pediatrics expresses its sincere appreciation to the Dallas ladies for their splendid cooperation in the matter of ladies' entertainment.

Be it resolved that the American Academy of Pediatrics sincerely appreciates the courtesy of the Dallas Pediatric Society; Libby, McNeill & Libby; the Mennen Company, and Mead Johnson & Company in providing the special events for members and their wives attending this meeting.

Be it resolved that the American Academy of Pediatrics expresses its sincere appreciation of the superior manner in which the Dallas Convention Bureau, and especially Miss Irene Mathews, handled the hotel reservations for the Annual Meeting.

Be it resolved that the American Academy of Pediatrics expresses its sincere appreciation to the local members in the Dallas area, and especially to Drs. Hugh Leslie Moore; Percy E. Luecke, Bruce A. Knickerbocker, and John E. Ashby for splendid cooperation in the planning and conduct of the Annual Meeting.

Be it resolved that The American Academy of Pediatrics expresses its sincere appreciation to the management of the Baker Hotel for the splendid cooperation of all the hotel executives as well as the employees, and expressly to Mr. Raymond P. Hall, President and Manager of the Baker Hotel; Miss Cleo Williams, Assistant to the Resident Manager; and Mr. J. R. Schaeffer, Sales Manager of the Adolphus Hotel during the preparation for and the period of the Annual Meeting.

Dr. Baty: Mr. President, the report of the Nominating Committee has been mailed to each member of the Academy. As the Chairman, I should like to thank the members who wrote to us suggesting names of possible candidates. We felt a particularly heavy responsibility this year in selecting the nominee for Vice-Presidency of the Academy because of these changes that have been outlined to you in the last two days. We felt that we needed to nominate someone, not only with the feeling of conferring an honor on one who had accomplished something for and in the Academy, but also to obtain the services of a worker who would be able to help carry out all of the activities that we are planning. Dr. Warren R. Sisson who comes from Boston and has practiced there for many years has been most active, as you all know, in the Academy. He was State Chairman of Massachusetts from the time of the founding of the Academy until two years ago when he accepted the Chairmanship of the Committee to carry out the Study of Child Health Services, and is now a member of the ICH Committee. The Nominating Committee is very pleased to present his name to you as a candidate for Vice-President (President-Elect). It was moved, seconded and carried that the Secretary cast a unanimous ballot for Warren R. Sisson for President-Elect.

Dr. Warren R. Sisson: I would like to say that I feel just exactly as you would if you were in the same position—quite incapacitated, and by experience very limited but challenged by the opportunity. Thank you.

Dr. Baty: Mr. President, the Nominating Committee would like to suggest for Chairman of District I, the name of Dr. Oliver L. Stringfield of Stamford, Conn., for reelection. It was moved, seconded and carried that Dr. Stringfield be reelected.

The Nominating Committee suggests for Chairman of District IV, the name of Dr. Hugh Jefferson Davis of Washington, D.C.

President Hill: Any nominations from the floor?

Dr. Luther W. Holloway, Jacksonville, Fla.: To refresh your memory, District IV covers one

of the biggest areas in the Academy. It extends from District of Columbia down to Puerto Rico, and we who live in the lower extreme of this district feel very definitely that we should have a chairman who lives in the most strategic location, so that we might communicate with him and have him more accessible on all occasions. I want to nominate a man for Chairman of this District who lives near the center of population and who has done outstanding work for the Academy. He has served as State Chairman, has worked very efficiently for the Academy, and initiated the survey for the Study of Child Health Services in North Carolina. I would like to nominate Dr. Arthur H. London of North Carolina.

President Hill: Dr. London has been nominated for Chairman of District IV.

Dr. Davis: Members of the Academy, I request that my name brought in by the Nominating Committee, be withdrawn.

It was moved, seconded by Dr. Harvey F. Garrison of Jackson, Miss, and carried that the name of Dr. London be accepted as a nominee for Chairman of District IV.

It was moved, seconded and carried that Dr. London be elected Chairman of District IV.

Dr. Baty: Mr. President, the Nominating Committee suggests the name of Dr. Thomas J. McElhenney, of Austin, Texas, as Chairman of District VII. It was moved, seconded and carried that Dr. McElhenney be elected chairman of District VII.

President Hill: Last year when I was inducted into office, two men escorted me up the steps. Dr. Toomey is already here and I don't see any way of having him escorted unless we make him go down and then walk up. It is now my pleasure and privilege to turn over this office, which I have enjoyed for the last year, to your President Elect, Dr. John A. Toomey and declare him officially your President.

Dr. John A. Toomey: Thank you, Dr. Hill. When I received a call asking me if I'd be willing to stand for the Presidency, I was flabbergasted. For the last three days, and for days previous, I have attended meetings of the Executive Board and have listened to your past President, Dr. Hill. I have marveled at his tact and his patience, his overall general knowledge and his very definite hearty workmanship that he has instituted during the past year. I hope, gentlemen, that when my term is finished, it can be said that I did half as well. If there is no further business, a motion of adjournment is in order.

This was moved, seconded and carried and the meeting was adjourned.

ROUND TABLE DISCUSSION ON ANTIBIOTICS

Chairman: Ralph V. Platou, M.D., New Orleans, La.
Associates: Waldo E. Nelson, M.D., Philadelphia, Pa.
Hattie E. Alexander, M.D., New York, N.Y.
Erling S. Platou, M.D., Minneapolis, Minn.
Myron E. Wegman, M.D., New Orleans, La.
Secretary: J. Victor Greenbaum, Cincinnati, O.

Chairman Platou.—We shall confine our discussion to the two antibiotics with which we are most familiar, and about which most controversial issues of practical nature arise in our daily work. Though optimal methods for employing these agents against all susceptible pathogens have not yet been clearly and finally defined, tremendous progress has been made. Questions of most clinicians center prominently about matters of specificity and laboratory controls, optimal dosage schedules and routes of administration, toxicity and therapeutic reactions, resistant strains, recurrent infections and clinical relapses, methods for prolonging and increasing desirable levels in body fluids.

All of us appreciate the attributes of an ideal antibiotic agent—it should be bacteriostatic or bactericidal, nontoxic for patients, active in vivo as well as in vitro, and of stable composition. All of these attributes have not yet been attained either for penicillin or streptomycin. Routes of administration, dosages, intervals, materials, and brief directions for a few specific disorders will concern us.

First, for a number of well-known reasons, the intramuscular route is still most commonly employed for administering penicillin and streptomycin—despite oft-justified and vociferous objections from our young patients. Dosage and intervals are, subject to considerable variation, guided by measurements of bacterial sensitivity and of effective levels in body fluids; ranges for both of these are too wide to permit generalizations. Because such measurements are not routinely made in many hospitals, a number of empirical dosage schedules have arisen to trip the unwary. Unfortunately they only suffice "most of the time," and that isn't enough where human lives are concerned. It may be true that effective levels of penicillins in blood serum range from 0.01 to 0.1 unit/cc.; it may be true that the top of this range is easily attained after a single injection of 100,000 units into an adult; it may be true that a single injection of 10,000 units into almost any infant or child gives a level within the range ordinarily effective for most susceptible organisms; certainly it is true that exceptions to such "rules of thumb" are common. Up go the doses, down come the intervals, on and on goes the list of possible therapeutic combinations, and into deserved prominence come methods for enhancing effects.

Except for particular clinical studies, fine adjustments of dosage related to body weight seem unnecessary and cumbersome, minor changes in individual doses related to clinical responses being almost ridiculous. The more sensible answer to proper and adequate dosage in cases of doubt is to outguess the laboratory or the organism in the earliest critical stages of uncertainty, and then go them both at least one better by multiplying dosage qs. By the same reasoning, all manner and types of therapeutic combinations can be designed and sometimes justified. Certainly, until or unless laboratory controls are available, and in desperate clinical situations, such practices seem reasonable. Certainly far greater dangers lurk in undertreatment than in short-term overtreatment with antibiotic agents. All of us in institutional work have seen many more ravages of inadequate treatment than we have of comparably severe side-effects; certainly the limitations imposed by bacterial resistance, particularly to streptomycin, are real.

On our own services, it is customary still to complete physical examinations and to "culture everything" before administering penicillin either alone or with sulfadiazine, in conventional dosage of from 10 to 20,000 units at 3 to 4 hour intervals. We probably follow some of the same rules of procedure our two next speakers will discuss for initial selection of proper therapeutic agents and subsequent adjustments.

Until regulations are passed to sharply curtail the frequency of nausea and vomiting with acute infections in children, oral administration of penicillin will have relatively little merit in situations where it would be most appreciated; given after a 3 or 4 hour fast, and in amounts 4 to 5 times that calculated to be necessary by parenteral routes, comparable levels are attained. Where tolerated and when expense is no object, oral preparations may be useful for minor infections, some ambu-

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latory patients, and perhaps in early convalescence. They certainly are not justified in common situations for which they are altogether too commonly used "to taper off," or "just in case." Most of us working almost entirely in hospitals have had little experience with slowly absorbed penicillins used far more often by our colleagues in practice. Until recently, expense had interfered with their use for our patients. Their place in the therapeutic spectrum will be defined by our fourth speaker. Preparations of penicillins for topical application have disappointed us except for treatment of such sharply localized infections as gonorrheal ophthalmia; even here, we have the feeling that they are better combined with parenteral administration. Aerosols, too, while occasionally effective alone, seem more so when supported by other routes of administration. Remarks on the relative virtues of the G, F, X, and K fractions of commercial penicillins are still a bit premature so far as any practical conclusions go; suffice it to say that while the actual composition of commercial preparations still varies, the relatively ineffective and most rapidly destroyed K fraction is currently being reduced in favor of an increase in G.

Factors of bacterial resistance and toxic reactions are far more important for streptomycin than for penicillins. While levels of from 3 to 30 μg/cc. are ordinarily adequate for most susceptible organisms, and are ordinarily attained by amounts approximating 40 mg./kg./day in divided doses for children, it seems wise to consider all possibilities and to carefully weigh need against known risks before this agent is used. Oral preparations are so poorly absorbed that they have little place for treatment of systemic or parenteral infections. Two of our speakers are well-primed to consider these matters. Almost all the streptomycin we use is given intramuscularly, striking for levels about four times those effective in vitro; we have seen no indication for using streptomycin intravenously. Increasing experience has cast some doubts on the wisdom of intrathecal uses, particularly in doses, concentrations, and at close intervals formerly employed. While we haven't information to justify discontinuance of intrathecal administration, we should certainly use this route with caution. For inhalational therapy of tracheobronchial infections, particularly pertussis, some of the early effects of streptomycin have seemed striking—some of the late ones disappointing. Emergence of resistance might be more common when streptomycin is used only by aerosol in pertussis.

So far as "routines" for particular diseases are concerned, our own practices and recommendations for a few specific conditions might be briefly outlined to serve as a basis for criticism and discussion: For infantile or late congenital syphilis in children, dosage schedules approximating 100,000 units of penicillins per kg. of body weight, divided into 100 equal injections and given at 3 hour intervals have yielded results equal to or better than any which have followed older forms of therapy. We have no adequate data yet on the effects of ambulatory treatment with slowly absorbed preparations, nor on possible synergistic effects after combined use of arsenicals and heavy metals in infants or children. Information concerning details of treatment for miliary and meningeal tuberculosis in infants and children is still meager. We looked over all that was available just a short time ago and discovered that among those who have apparently recovered the following observations were obtained: total daily dosage of streptomycin had varied from 0.05 to 0.15 gm./kg. in 6 to 8 daily injections for periods of from 60 to 120 days; intrathecal doses had ranged from 50 to 100 mg. at from 12 to 48 hour intervals through about the same period. There is certainly a crying need for a large and carefully conducted cooperative clinical study to quickly define the best means for using streptomycin alone or together with agents such as the promin derivatives in these most desperate of all clinical forms of tuberculosis. Recent studies on susceptibility of tubercle bacilli during streptomycin therapy seem to justify a trend toward smaller doses, over shorter periods approximating six weeks. High doses for long periods have not solved the problem of emergence of resistance, and vestibular damage occurred in almost all patients. For the acute bacterial meningitides, our practices are exactly those which have been expressed so well by Dr. Alexander, and are undoubtedly familiar to you all. Though it is our clinical impression that streptomycin has increased the good results we had with sulfadiazine and specific antibody nitrogen previously, we haven't yet added up enough data to prove the point. We now employ intrathecal streptomycin only in small doses and less frequently; we don't exceed 25 mg. at a dose, ordinarily giving about 2 mg./kg., and rarely repeating this more than 3 times. We employ streptomycin for treatment of urinary tract infections only after a carefully planned campaign, only after other familiar measures have failed, and only after susceptible organisms have been demonstrated. Therefore, our experience is limited. We insist on preliminary alkalinization, adjust dosage to furnish about 0.5 gm. of fluid intake, and take frequent follow-up

cultures. Indications for continuing the drug beyond three or four days will certainly be rare. We can't take the time here to discuss details of adjunctive therapy, important as they are. As a prime example, there is little or no point in streptomycin therapy for a chronic urinary infection unless causes for urinary stasis are corrected.

Dr. Nelson: **The selection of antibiotic agents.**

This phase of the discussion of antibiotic agents is limited to penicillin and streptomycin, the only two which are in clinical use for systemic infections at the present time. It does seem appropriate, however, to consider the chemotherapeutic agents insofar as they may be employed with or in place of antibiotic agents. In certain infections a sulfonamide may be as effective as an antibiotic agent, or even more so. Furthermore, in very severe infections, sulfonamides may have very beneficial additive effects when used in conjunction with an antibiotic agent.

In the management of a particular infectious illness certain obvious decisions must be made. Initially the physician would like to know if the etiologic agent is or is not susceptible to an antibiotic or a chemotherapeutic agent. In the majority of instances such information is obtainable only from careful laboratory studies and principally from bacterial cultures. Such data are usually not available for 24 hours or more, and antibacterial therapy should not be delayed in the case of severe infections until they are. Cultures from appropriate sources should be obtained, however, in every severe infection before antibacterial therapy is started, as a guide to the subsequent clinical management. Thus, if after the initial clinical appraisal, the physician assumes that the patient is sufficiently ill to warrant antibacterial therapy, presumptive decisions must be made in regard to the nature of the infectious agent and to the probability of it being susceptible to a particular antibiotic agent or sulfonamide. It may be emphasized here that there is no justification for treating every infectious illness with an antibacterial agent. In very severe infections on the other hand, as for example when there is a presumptive diagnosis of septicemia or osteomyelitis, combined therapy with adequate doses of pencillin and a sulfonamide should be employed. Subsequently when an etiologic diagnosis has been established, the initial therapy is continued if the organism is susceptible to penicillin, or streptomycin is substituted for the penicillin if the organism is a gram-negative bacillus or a staphylococcus which is resistant to penicillin but susceptible to streptomycin. In diseases such as purulent meningitis, pleural empyema, or pyarthrosis, suitable biologic material should be obtained for smears and appropriate bacteriologic procedures before therapy is initiated. In all instances except when a gram-negative bacillus is demonstrated, penicillin and a sulfonamide are indicated. The use of streptomycin, because of its serious toxic effects on the eighth nerve and the vestibular apparatus, should be limited to cases in which gram-negative bacilli are demonstrated by initial smears or cultures, to serious cases in which other organisms such as the staphylococcus are found to be resistant to penicillin and susceptible to streptomycin. Rarely is it justified to delay administration of antibacterial agents in the presence of serious infectious illness until the etiologic agent has been finally identified. A possible exception exists when subacute bacterial endocarditis is considered in the differential diagnosis.

Both for the initial prescription and for subsequent adjustment (addition of another agent, substitutions or increases in dosage), the physician should make use of easily available charts showing the relative susceptibility of various species of pathogenic organisms to penicillin and to streptomycin. He should also be aware of variations in susceptibility to antibiotic agents among various strains of a particular species of bacteria. For example, Staphylococcus aureus as a species is susceptible to penicillin, but some strains (about 15%, according to some estimates) are quite resistant. Some of these are susceptible to streptomycin, others are not. In a similar manner certain strains of Esch. coli are quite susceptible to streptomycin, whereas others are not. It should also be recognized that susceptibility is relative, and that dosages of either penicillin or streptomycin should be gauged to provide levels in the blood somewhat higher than the infecting organisms in vitro susceptibility.

Whether it is necessary to maintain such a high level or whether it is sufficient to attain it one or more times during a 24 hour period is a pertinent question. The limited data available suggest that continuously maintained high levels may not be necessary for the therapeutic control of many pathogenic organisms.

The paper-disc method described by Bondi et al. provides a simple and rapid means for

determining relative susceptibility of organisms to penicillin and to streptomycin from the initial (pretreatment) culture. Even though the culture is a mixed one, the relative susceptibility of the various organisms making up the mixture can be evaluated to an extent which is helpful in determining the antibiotic agent or agents to be employed. The method is also valuable in the subsequent evaluation of a patient when there is an exacerbation and the question arises as to whether the original infecting organism has "developed" resistance to the antibiotic, whether other pathogenic organisms are present as secondary invaders, and whether they are susceptible or resistant to either streptomycin or penicillin.

Evidence available from clinical experience and from animal experimentation demonstrates that penicillin, streptomycin and the sulfonamides do not interfere with the action of one another. In fact, in many instances the combination of one of the antibiotics with a sulfonamide seems to have a more effective antibacterial action than either one of them alone. In the treatment of severe infections, even when the relative susceptibility of the infecting agent to penicillin or streptomycin is known, it would seem wise to prescribe a sulfonamide in conjunction with the indicated antibiotic.

There is also some evidence which indicates that at least in experimental animals (data not available for man) arsenic and bismuth augment the antibacterial effect of penicillin in the treatment of syphilis and that promin and other related sulfonamides similarly increase the effectiveness of streptomycin in experimental tuberculosis.

No hard and fast rules can be made in regard to dosage. The quantity of the agent and the frequency of administration should be based on severity of infection, relative resistance or susceptibility of the infecting agent and whether other antibacterial agents (sulfonamide or antibiotic) are employed for their additive effect.

In general, relatively large doses should be employed but only for a period of time sufficient to secure an adequate effect. Somewhat smaller doses of individual agents appear to be adequate when more than one effective agent is employed simultaneously; for example, a combination of penicillin or streptomycin, with a sulfonamide. Even a combination of two or more sulfonamides appears to have practical advantages over the prescription of a single one.

Dr. Alexander: **Origin of Resistance of Bacteria and Therapeutic Implication.**

It is now apparent that each of the antibacterial agents contributed during the past ten years is limited in its capacity to overcome severe infections caused by susceptible organisms. One of the limiting factors is emergence of resistance of the infecting organism. Experimental data suggest that large populations of all species of bacteria possess a similar defense mechanism against any clinically effective antibacterial agent. The members which defend the race are present before exposure to the injurious substance, the antibiotic. They differ from their associates in that they have a capacity to thrive in concentrations of the agent which are injurious to the masses. As a result of their reproduction the strain emerges resistant. At times these defenders grow in concentrations of the antibiotic impossible to attain in biologic fluids. The therapeutic importance of emergence of resistance varies with the antibacterial agent and the organism.

Emergence of resistance of the infecting organism has been recognized to play a significant role in failure of sulfonamide therapy only in streptococcus, staphylococcus and gonococcus infections. The use of penicillin in conjunction with sulfonamides in severe infections has doubtless minimized this problem.

From clinical experience of the past six years, failure of penicillin therapy, because of resistance of the infecting agent, has been a significant problem only in staphylococcus infections. On the other hand, increased resistance of the infecting organism has been recognized during treatment with penicillin. Resistant strains of N. intracellularis (meningococcus) have been identified in spinal fluid of patients treated with penicillin alone for meningococcus meningitis. Both hemolytic streptococci and pneumococci showing a significant increase in resistance have been isolated from patients whose infections failed to respond to the usual dose of penicillin. Resistant strains of T. pallidum have been recovered when rabbits infected with syphilis have been treated with inadequate dosage of penicillin. While it is stated that practically no penicillin resistance of spirochetes has been observed, there are reported cases of "treatment resistance," failure of lesions to heal and persistence of organisms in lesions in spite of treatment.

A number of attempts to increase the resistance of strains of Staphylococcus aureus, Streptococcus pyogenes, and D. pneumoniae by growth in increasing concentrations of penicillin have been successful. This is accomplished with greater speed and a higher degree of resistance is attained with Staphylococcus aureus than with either of the other two. Miller has demonstrated the appearance of highly resistant forms of N. intracellularis (meningococcus) and N. gonorrhoeae under comparable circumstances.

While thus far emergence of resistance of the infecting organism to penicillin has not been a serious problem in treatment of infections, save for those due to Staphylococcus aureus, it is clear that the efficacy of streptomycin is greatly limited by this phenomenon. It has already been reported to be an important problem in the treatment of influenzal meningitis, urinary tract infections caused by one of many different gram-negative bacilli, and tuberculous infections.

The origin and nature of these members of a bacterial population which can be responsible for therapeutic failure is of practical as well as theoretical importance. Two hypotheses have been postulated to explain the origin of drug-resistant strains of bacteria. According to one view, resistance is the result of specific adaptation of the organism in response to the influence of the antibacterial agent. There are no data which support this hypothesis. The other holds that resistant cells arise by mutation and are therefore present in all large populations and are merely selected when grown in the presence of the drug. Their original occurrence is entirely independent of the presence of the injurious agent. There is now ample proof that bacteria resistant to antibacterial agents do arise spontaneously as the result of bacterial mutation.

Horsfall was the first to report the presence of D. pneumoniae resistant to sulfadiazine among a predominantly sensitive population, before any exposure to the drug. Unfortunately the details were never published but the data are quite comparable to some reported by Demerec, to be described later. Dubos reports similar results for staphylococci resistant to gramicidin. A group of geneticists were the pioneers in investigations as to the origin of resistance of bacteria. In 1943, Luria and Delbrück, and Demerec and Fano published conclusive evidence that members of E. coli populations which are resistant to the action of specific bacteriophage, lethal for sensitive cells, arise as the result of bacterial mutation. The rate of occurrence of these mutants was found to be 10^{-8} per bacterium per bacterial generation. Irradiation by X-ray or ultraviolet light produced a significant increase in this rate.

Demerec was the first to present conclusive evidence that staphylococci resistant to penicillin may arise as a result of bacterial mutation. This work is worthy of special emphasis and is therefore described in some detail. He used for these experiments a strain of Staphylococcus aureus, #313, which because of its sensitivity is used for determining penicillin concentrations in biologic fluids; and yet in a population of one billion organisms it was easy to demonstrate cells resistant to 0.12 units per cc. A concentration of 0.15 units per cc. was required to eliminate all bacteria. However, among survivors at a penicillin concentration of 0.125 units per cc. individuals resistant to 0.25 units per cc. are found; some survivors on 0.25 units per cc. resist 0.5 units per cc. On 0.5 units per cc. there are survivors which can grow in 5.0 units per cc. From these there were found individuals resistant to 250 units per cc.

The two hypotheses which have been postulated to explain the origin of resistance were examined. Demerec reasoned that if resistance is induced through interaction of bacteria and penicillin, similar numbers of resistant bacteria could be expected to be present among comparable populations of the same strain. In the event that the origin of resistance is mutational, the situation would be quite different. One would expect to find similar numbers of resistant colonies only in samples taken from the same culture; the variation in number of resistant bacteria among samples taken from separate cultures should be much greater than between samples taken from the same culture.

Random occurrence of these variants was in fact demonstrated with a significantly different prevalence in independent cultures of the same strain and population size. This is consistent with the hypothesis that the origin of resistance is mutational. Moreover, the resistance of these variants was transmitted unchanged in degree through 20 subcultures in the absence of penicillin; thus, inheritance of the trait is established.

To explain the degree of resistance, Demerec assumes that there are a number of genes that affect resistance to penicillin. The effect of the mutation of a number of these genes is

cumulative. The high degree of resistance is the combined effect of all the mutations. Emergence of a high degree of resistance was shown to be a slow process, quite different from the type which operates in the emergence of resistance to streptomycin.

The therapeutic failure of streptomycin in a number of bacterial infections has clearly established the part played by emergence of resistance of the organism. Our interest was focused first on the influence of this limiting factor in the treatment of H. influenzae infections with streptomycin. The results are given in some detail because it is representative of the character of emergence of resistance to streptomycin which thus far has been encountered in all species examined. In contrast to the relatively low degree of resistance of bacteria to penicillin, demonstrable in the initial culture before exposure to the antibiotic, cells with a high degree of resistance to streptomycin may be found with ease.

Our efforts to evaluate the separate influence of streptomycin in influenzal meningitis led to the use of this antibiotic in 12 patients as the only therapeutic agent unless it was evident from an unsatisfactory response that amplification was needed. This resulted in early recognition of the part played by emergence of resistance. The dosage schedule used has already been outlined by Dr. R. V. Platou.

Although all but one of these patients were receiving sulfadiazine at the time of admission, they then received streptomycin alone, either throughout the period of treatment or for four days before the addition of other agents. From analysis of this group it is evident that recovery was prompt in the 8 patients in whom the infection was mild or moderately severe, as judged by the concentration of sugar in the spinal fluid before treatment, as well as by clinical signs. On the other hand, those with severe meningitis were not cured with streptomycin alone. In two of these patients and one with H. influenzae epiglottitis, emergence of resistance of the organisms to streptomycin was proved to be the cause of therapeutic failure. This experience led to a study of the origin of resistance.

Origin and Nature of Resistant Type b H. influenzae to Streptomycin: The strains isolated before streptomycin therapy from 9 of these 12 patients, and one with epiglottitis were studied for evidence of fundamental differences between organisms from patients in whom streptomycin had failed and those from patients who were promptly cured. From three patients resistant organisms made up either 100% or an appreciable part of the population grown during unsuccessful therapy with streptomycin. Experiments were designed to determine the origin and nature of these resistant organisms.

Routine in vitro and in vivo sensitivity tests, which examined populations varying approximately from one million to 1,700 million organisms, had failed to reveal a significant difference among these strains isolated prior to streptomycin treatment.

Certain factors learned from patients in whom streptomycin therapy was unsuccessful directed us to the approach to be described. Resistance of the culture developed only in patients with severe meningitis treated with streptomycin alone. When emergence of resistance of the strain was responsibile for therapeutic failure, a relatively small inoculum of the culture from the spinal fluid grew on Levinthal agar containing 1,000 μg. of streptomycin per cc. In one patient 100% of the population of the culture grown from the spinal fluid withdrawn 24 hours after beginning streptomycin therapy showed resistance of 1,000 μg./cc. This concentration is so rapidly bactericidal for sensitive organisms in vitro that it is possible to examine for presence of these rare resistant cells among 15 to 30 billion organisms in each pour plate of Levinthal agar containing 1,000 μg. of streptomycin per cc. without inhibiting growth of the resistant organisms by accumulation of bacterial metabolic products. Sensitive organisms are killed before they have a chance to reproduce. Therefore enormous populations of each of the ten strains (142 to 522 billion) were examined by this procedure which could demonstrate the presence, even in very small numbers, of organisms resistant to 1,000 μg. of streptomycin per cc.

All 10 cultures studied by this procedure before exposure to streptomycin contained a minute fraction of members which can grow in the presence of 1,000 μg./cc. of the antibiotic. Their prevalence in the different strains varied from one resistant variant in 1.1 billion organisms to one in 13.8 billion. No correlation existed between the size of this ratio and the emergence of resistance of a strain during treatment of the patient. The results demonstrate that the emergence of resistance is a selective process: the sensitive members are killed, permitting the resistant

organisms to declare themselves. The size of the bacterial population is the most important single factor among those which determine the potentialities of a strain to exhibit this degree of resistance during treatment of a patient.

These resistant variants, apparently present in large populations of all sensitive strains of H. influenzae, have been proved to arise as a result of bacterial mutations. While knowledge of the genetics of bacteria is very limited, certain characteristics are accepted as essential criteria for labeling variants as mutations: (1.) evidence for the random occurrence of resistant variants, showing significant variation in prevalence in different independent cultures of the same strain and population size; (2.) a low but constant rate of occurrence, specific for any given strain, which is consistent with mutation frequency; (3.) transmissibility of the variant trait through many generations to prove that it is inherited. Experiments were designed to re-examine the same 10 strains for these characteristics.

The resultant data which demonstrate the continuous irregular occurrence of new resistant members, varying significantly in prevalence in independent cultures of same strain and population size, support the mutation origin. A comparable variation was exhibited by relatively genetically homogeneous cultures. The mutation rates of 10 strains are very low and do not differ significantly. They vary from 2.6×10^{-11} to 7.0×10^{-11} per bacterium per bacterial generation. Resistance has been proved to be an inherited trait.

Therefore, since resistant variants have been proved to arise spontaneously through bacterial mutation, we can expect their continuous random occurrence in patients if the disease is sufficiently severe or, in other words, if the bacterial population is large enough. The rate of occurrence of the resistant mutants did not differ significantly among the 10 strains. Therefore, the emergence of resistance of the strains in the 3 patients in whom streptomycin failed can not be explained on a greater frequency of occurrence of mutations. The resistant trait is transmitted unchanged in degree through many generations. Therefore, the appearance of a few mutants in a patient during treatment can lead to a serious infection which is subsequently uninfluenced by streptomycin. Moreover the persistence of resistant organisms in the nasopharynx of patients whose strains emerged resistant during streptomycin treatment constitutes a significant public health problem. In one patient in whom the organism emerged resistant during treatment with streptomycin alone, and who recovered following institution of specific rabbit antiserum and sulfadiazine, all of the cultures from the nasopharynx over a period of nine months subsequent to recovery showed the presence of type b H. influenzae which grew in the presence of streptomycin in a concentration of 1,000 μg./cc.

At the Babies Hospital, a variety of other bacteria have been studied by a comparable technique; large populations of each one of these gram-negative bacilli examined, contain initially a minute fraction of cells resistant to concentrations of streptomycin as high as 1,000 μg./cc. The resistant members of these species have exhibited the same characteristics of bacterial mutants already described for H. influenzae. These facts have been proved to apply to the following organisms: H. pertussis, H. parapertussis, Esch. Coli, S. newport, Ps. aeruginosa and E. typhi.

Oakberg and Luria made an important contribution when they proved that Staphylococcus aureus cells resistant to sulfathiazole arise as a result of bacterial mutation. They occurred at a rate of 10^{-9} to 10^{-10} per bacterium per bacterial generation.

Other examples of the presence of resistant cells in populations before exposure to antibacterial agents have been published. Klein and Kimmelman reported that large populations of 6 different species of enteric organisms contain cells which grow in a concentration of 1,000 μg./cc. before exposure to the antibiotic. Subsequently, these authors found variants with a similar degree of resistance in large populations of E. coli, P. vulgaris and several strains of staphylococci. Miller has demonstrated the presence in large populations of 18 strains of N. intracellularis (meningococci), of cells resistant to concentrations of streptomycin as high as 1,000 μg./cc. Two types of colonies were formed by resistant organisms; the growth characteristics of one suggest a change in nutritional requirements similar to those described for one group of resistant H. influenzae colonies.

Pyle has just reported similar observations on tubercle bacilli. An even more recent report by Vennesland and associates demonstrated the presence, in large populations of a strain of human M. Tuberculosis (Strain H-37RV), of a minute number of cells which grow in 37 μg./cc. The organisms which grew in this concentration could thrive in concentrations of over 1,000 μg./cc. Results of the treatment of tuberculosis with streptomycin have established the fact that emergence of resistance of the strain is closely correlated with therapeutic failure.

Thus, the pieces are fitting together in a pattern which is taking definite shape which suggests that all bacteria possess a similar defense mechanism against any effective antibacterial agent. Evidence has been presented that this protective device operates against all antibacterial agents which have been studied, bacteriophage, sulfonamides, gramicidin, penicillins and streptomycin. The spontaneous occurrence of mutants resistant to ultraviolet light has also been reported. In other words a large population of any organism even if it originates from a single colony cannot be viewed as being homogeneous with respect to sensitivity to a given effective agent. Over 99% of the members show susceptibility to a very low concentration; the rest differ in their resistance. The range of resistance of this small minority to penicillin has not yet been shown to be great without utilizing the process of selection as Demerec did. On the other hand, the variations in resistance to streptomycin among this small fraction is readily proved to be very great. In H. influenzae for example, regardless of the size of the population, over 99% of the organisms are eliminated by a concentration between 1.5 and 2 μg./cc.; the rest of the population resist concentrations between three and more than 1,000 μg./cc. This difference between the two antibiotics is reflected in the rapidity of emergence of resistance and the degree attained during treatment of infections.

Practical Significance of These Principles: Optimal Dose as Early as Possible:—the size of doses needed for a given patient must be governed by the causative organism, severity and site of infection. Therefore, it is essential to identify the site, estimate the severity, and diagnose the etiology of infection as early as possible by collecting for cultivation, before start of treatment, all biologic fluids indicated; for example, blood, nasopharyngeal mucus, spinal fluid, urine, etc. Determination of initial sensitivity of the infecting organism is needed as a guide to therapy only under a few circumstances at present. There is reason to believe that this state will change. In any event the following facts appear to be true: cultures of Streptococcus pyogenes and of D. pneumoniae have not yet been shown to differ significantly in their sensitivity to penicillin, and the variation in the susceptibility among H. influenzae and P. tularense strains to streptomycin is small. On the other hand the variation among strains of Staphylococcus aureus and S. viridans to penicillin and Ps. aeruginosa (pyocyaneous) and many other gram-negative bacilli to streptomycin makes initial sensitivity test an essential guide in the treatment of these infections. Whether the greater resistance of some strains of these organisms is the result of previous exposure to antibacterial agents or merely an index of high prevalence of resistant mutants is not known.

Repetition of Sensitivity Test:—while it is not essential to know the initial sensitivity of all infecting organisms, the susceptibility of any infective agent which persists during treatment must be checked frequently. The organism may exhibit resistance to a concentration of antibiotic which cannot be attained in most biologic fluids. It is then useless to continue the agent. This is of particular importance during treatment with streptomycin since its toxicity is closely related to duration of therapy. The degree and rapidity of emergence of resistance are conditioned by a number of factors: the size of bacterial population, the concentration to which the organism is exposed, the occurrence rate of the resistant mutants, and the number of antibacterial agents used.

"Tapering Off" of Dose of Antibacterial Agent Is Not Justified:—from the beginning to the end of treatment the antibacterial agent must be brought into contact with the organism in a concentration exceeding that which in vitro is sufficient completely to prevent growth of a large bacterial population.

Combined Effect of Agents:—there is reason to believe that sulfadiazine, streptomycin and penicillin exert their injurious effects on bacteria through different mechanisms. Therefore, the mutants resistant to one can be influenced by the other two. For this reason severe infections should be treated by the combined effect of at least two agents. The combinations most frequently needed are penicillin with sulfadiazine, and streptomycin with sulfadiazine. Occasionally it is necessary to add specific antiserum to either of these two, and very rarely in a severe meningeal infection due to a gram-negative rod of the enteric group all three of the above agents, sulfadiazine, penicillin and streptomycin, are indicated.

Use of Antibacterial Agents Only When Clearly Indicated:—indiscriminate use of any antibacterial agent can be responsible for wide distribution of relatively resistant strains. There is evidence that this occurred when sulfadiazine was used prophylactically. H. influenzae which emerges resistant, both in spinal fluid and nasopharynx, to 1,000 μg. of streptomycin per cc. during treatment with this antibiotic, can persist in this resistant form in the nasopharynx for as long as nine months. There is also on record a case of fatal tuberculous infection in a child, infected by a resistant strain from her father who had streptomycin therapy; her meningitis was not influenced by streptomycin.

There is reason to believe that if severe infections are treated with two effective agents, acting through different mechanisms, survival and spread of resistant mutants can be diminished. The use of prophylactic dosage of antibacterial agents is contraindicated except in carefully selected patients with recurring rheumatic carditis who, when the process has become quiescent, first receive full dosage of both penicillin and sulfadiazine for a period long enough to eliminate Streptococcus pyogenes. The use of low dosage of a single agent because an infection is mild is contraindicated.

Realization that the human animal is endowed with a remarkable capacity to resist serious consequences of infections will stand us in good stead. I refer to his own production of very specific antibacterial substances, antibodies.

Dr. Erling S. Platou: **Enhancement of Antibiotic Effects.**

Penicillin: Since the introduction of penicillin the problem of its rapid absorption and excretion has occupied the attention of many workers. Although there are precise biologic methods for determining plasma levels of penicillin, optimal duration of effects on bacteria in vivo needs further study. Large losses in the urine were recognized early, when shortages required recovery and re-use. The renal clearance of commercial penicillin is 750 cc. to 1,200 cc/min., approximating that of total renal plasma flow. When crystalline penicillin G or X is given intramuscularly in aqueous solution, 60% of it can be recovered in the urine by the end of an hour. Blood levels fall off at the rate of approximately 70% per hour after penicillins are given in aqueous solution intramuscularly. In spite of lower renal clearance, penicillin K yields relatively low plasma levels due to an organic combination with proteins which also lessens its potency. The effective plasma concentration of penicillin mixtures is presently thought to center about 0.03 unit per cc. for most penicillin-susceptible organisms. Whether a sustained level above this arbitrary minimum or a periodic "peak" is preferable has been controversial. Persistently high concentrations have been assumed to be effective in combating unusual cases with fulminating or stubborn infections; a combination of constant and "peak" effects is believed by some to be even better.

Approaches to the problem of enhancing and prolonging the effectiveness of penicillin have included such measures as:

I. Varying and combining routes of administration
II. Slowing absorption
III. Blocking tubular excretion
IV. Employing selective inhibitory effects to alter tubular enzymatic mechanisms (Caronamide)
V. Combining methods
VI. Reactivating insoluble penicillin salts in vivo
VII. Using an alternate antibiotic with slow absorption curve
VIII. Varying frequency and size of dosage

I. Varying and Combining Routes of Administration:

For the vast majority of penicillin-susceptible infections periodic levels of penicillin from 0.01 to 0.1 units per cc. of plasma are adequate. To attain such levels intramuscular injections of aqueous penicillin in doses of 10,000 to 25,000 units or oral penicillin in doses of 50,000 to 100,000 units have been found successful in infants and children.

In infections of the respiratory tract, inhalation in aerosol has been useful particularly as an adjuvant to intramuscular administration; surprisingly high levels have sometimes been attained after inhalation alone. Bryson, Grace, Prigal et al. have reported that penicillin given in doses of 100,000 to 200,000 units suspended in aerosols of propylene glycol-glycerine or zephiran-glycerine alone produce apparently adequate blood levels for as long as five hours. This mode of therapy has proved beneficial in purulent sinusitis, as well as in fibrocystic disease, intrinsic infectious asthma, bronchiectasis and other diffuse bronchial or bronchiolitic diseases. Although a suitable nebulizer, a source of oxygen, and a rubber tube are adequate equipment for older children, in infants and younger children an apparatus such as that described by Prigal is perhaps superior. The method of penicillin therapy described by Bryson and Grace for respiratory infections combines penicillin intramuscularly in wax and oil every 24 hours (300,000 units), neosynephrine hydrochloride by nebulizer, penicillin 100,000 units in three cc. of zephiran chloride (1-1,000 aqueous, as a detergent) for inhalation every eight hours, and deep breathing to accomplish the topical principle.

Local penicillin injected into pleural, pericardial, peritoneal, and synovial cavities enhanced the effects of conventional administration. Similarly in meningitis, small well diluted intrathecal doses of 5,000 to 10,000 units have seemed helpful, though larger ones have been followed by immediate or late irritative and degenerative effects on the nervous system.

In thrombophlebitic lesions, i.e. osteomyelitis, sinus thrombophlebitis, subacute bacterial endocarditis, etc., apparent enhancement of penicillin effects has apparently followed concomitant use of anticoagulants. Since the minute lesion of meningitis has been shown to be thrombophlebitic the question has been raised at to whether anticoagulants might be also considered for this disease.

When oral penicillin was first used, variations of concentration occurred in different patients and even in the same patient from hour to hour; fluid and food ingestion were shown to influence this. It was believed that penicillin was ineffective when taken by mouth because of destruction in the stomach, irregularities in absorption, and inactivation by residual food. Experiments conducted by Finland, McDermott, Libby, Cutting, and Hoffman and Volini have resulted in several interesting conclusions: First, the oral dose of penicillin must be about five times the intramuscular dose to produce comparable blood levels for three hour periods. Second, addition of binding or buffering substances does not increase therapeutic levels significantly. Saline solutions of penicillin were more easily passed out of the stomach by spurts, allowing more rapid and complete total absorption. The effects of food were best minimized by giving penicillin one hour before meals, after a three or four hour fast. The work of Hoffman and Volini has shown that in older children and adults penicillin levels are best maintained orally by an initial dose of 200,000 units in saline followed in one hour by 100,000 units and then 100,000 units every three hours. By this plan blood levels well above 0.03 unit per cc. were maintained, although individual variations occurred. Doses of 25,000 units have been reported by Husson as producing adequate levels in infants.

II. Slowing of Absorption:

Several methods of slowing absorption have been tried, including such simple physical changes as cooling the site of injection. The most effective method developed thus far has been the use of suspensions in beeswax and peanut oil (Romansky Formula).

The first major attempts to prolong the activity of penicillin by the addition of a binding substance were made in 1943 and 1944. Beeswax was found to be best for the purpose but it produced rather frequent tissue reactions. By using small concentrations of beeswax in peanut oil it was found possible to avoid most of these. Concentrations of 4 to 4.8% beeswax in peanut oil were thought to produce a minimum of local inflammatory processes. Subcutaneous injection was found to be less painful than intramuscular.

One hundred thousand units of penicillin in 1 cc. of this mixture prolonged effective therapeutic levels of penicillin for six to eight hours after injection; 200,000 units increased absorption time slightly but 300,000 units in 1 cc. of 4.8% beeswax in peanut oil (given intramuscularly) often prolonged blood levels for 24 hours. Less than 300,000 units per injection was considered inadequate and more than 300,000 units merely prolonged the initial peak blood level but did not give sustained concentrations of much greater magnitude.

Recent work by Dowling and Romansky indicates that the greater the particle size of penicillin in an injectable mixture, the greater its effect in delaying absorption. They found that in order for absorption to be adequately prolonged for 24 hours, at least 50% of the particles in the mixture should have diameters of 50 microns or more. Because amorphous penicillin does not achieve this end as well as crystalline penicillin, these investigators believe that crystalline calcium penicillin, when given intramuscularly in 2% beeswax in peanut oil, produces more constant absorption and more effective blood levels than any other mixture we have at the present time.

Loewe and his associates have described a water soluble preparation of penicillin containing gelatin-dextrose, ephedrine sulfate, and epinephrine hydrochloride which they claim will maintain measurable levels for 24 hours or longer and retain stability at room temperature for over a year.

III. Blocking Tubular Excretion:

Normal renal tubules excrete about 80% of penicillins found in urine; thus, any drug which could effectively yet harmlessly block tubules might conceivably raise plasma concentrations. Diodrast or iodypyrin (commonly used in urography) and para-amino-hippuric acid (used in functional tests

of the tubules) have been successful for this purpose. Penicillin excretion can be almost completely suppressed by continuous intravenous infusion of either of these drugs, and high levels of penicillin can be obtained. Such large quantities of the inhibitors are required that the method has been found somewhat impractical even though it has accounted for some striking therapeutic results in stubborn infections. Benzoic acid and sodium benzoate have also been tried, with apparent enhancement of plasma concentrations.

IV. Employing Selective Inhibitory Effects on Tubular Enzymatic Mechanism:

Beyer et al. introduced caronamide, believed to be wholly excreted by glomerular filtration but which may have a selective inhibitory effect on the enzymatic mechanism of the tubules, thus suppressing tubular excretion in a manner different from mass competition or blocking caused by diodrast or para-amino-hippuric acid.

Strauss studied the effectiveness of caronamide and sodium benzoate individually and in combination. Sodium benzoate apparently has an antipenicillinase effect which some contend may explain its properties more accurately than the blocking effect. Its lower toxicity and cost might make it more desirable. The dose employed has been 1.2 gm. per 100,000 units. Caronamide is supplied in 0.5 gm. tablets and is given in doses of 0.4 gm./kg./day. Since it is excreted in four hours, the dose interval should be about three hours. Some of the observations of Strauss on caronamide and sodium benzoate were to the effect that caronamide or sodium benzoate given orally enhanced the plasma penicillin concentration following either oral or intramuscular administration of penicillin. Oral penicillin in combination with both caronamide and sodium benzoate resulted in greater enhancement of the plasma penicillin concentrations than was found with either of the two drugs alone. Both caronamide and sodium benzoate were shown to have a serious limitation however; under certain conditions they apparently accentuate the variable absorption already observed after oral administration of penicillin.

Crosson et al. reported that caronamide given orally "elevates" the plasma concentration of penicillin two to seven times following its oral and parenteral administration. They concluded that both oral and intramuscular administration of penicillin is enhanced by the oral use of caronamide.

Seeler, Wilcox, and Finland reported similar findings in older subjects, but observed that approximately twice the dose of caronamide was necessary to produce equivalent levels in persons of a younger age group.

Rapoport and associates reported no toxicity due to caronamide in 15 children studied; penicillin levels were markedly elevated with doses of 0.4 gm./kg./day divided and given at three hour intervals. Eagle contends that "to maintain an effective concentration of such blocking agents may prove no less laborious and with some of these agents no less costly than to repeat the injections of penicillin or to increase the dosage."

TABLE I

PENICILLIN IN BEESWAX AND OIL PLUS ORAL PENICILLIN, COMBINED WITH SUPPRESSED RENAL CLEARANCE (BY CARONAMIDE AND SODIUM BENZOATE) (Infants of three months)

Time after injection of 300,000U penicillin plus 50,000U penicillin at 12, 15, 18, and 21 hours	Penicillin Conc. during control period	Average penicillin conc. obtained during Caronamide plus Sodium Benzoate Therapy
15	0.51	2.56
18	1.02	2.024
24	0.13	0.355
26	<.06	.06
28	<.06	.06

V. Combining Methods:

Combined methods of penicillin administration and clearance suppression have been extensively studied. Trussell, Sinclair, and Buchanen recently reported observations on patients to whom intramuscular injections of penicillin in 2% beeswax in peanut oil were given, and compared with levels obtained from others who received similar injections complemented by oral penicillin. Eighty per cent of the patients had assayable levels at 24 hours, after 300,000 units of intramuscular penicillin alone—the average concentration being 0.058 units per cc. at this time. Intramuscular injection of 300,000 units followed by 100,000 units orally at 12, 15, 18 and 21 hours yielded assayable levels in all subjects at the end of 24 hours, the average level at this time being 0.139 units per cc.

Suppressed renal clearance has been most effectively accomplished to date by a combination of sodium benzoate and caronamide. Combining this suppression of renal clearance demonstrated by Strauss with the delayed absorption technic of Trussell and associates, we have attempted to raise and prolong levels in infants.

Table I reveals a tendency toward higher and more prolonged levels in infants who received penicillin in oil-beeswax and oral penicillin together with caronamide and sodium benzoate. A high "peak" is demonstrated, but the number of observations is still small. Study is now in progress to determine whether this combined technic merits its use in overwhelming infections.

VI. Reactivating Insoluble Penicillin Salts in Vivo:

Injecting silver, mercuric, and ferric penicillinate into rabbits, Monash has recently been able to show that inactive insoluble penicillins may be reactivated in vivo. One injection of 20,000 units of silver penicillinate produced a blood level of 0.08 units per cc at 17 hours; one of mercury penicillinate a level of 0.08 units at 17 hours; and one of ferric penicillinate a level of 0.16 units per cc. at 17 hours. Similar blood levels were recorded after organic substances such as brilliant green penicillinate in rabbits.

VII. Using Alternate Antibiotic with Slow Absorption Curve:

Eagle and his associates have studied Bacitracin. This substance, discovered by Johnson, Anker, and Meleny in culture filtrates of B. subtilis, possesses bactericidal properties and has a low renal clearance. Although samples studied to date are gravimetrically only 1/12 as active as penicillin G in vitro, in this respect its slower excretion and resulting higher blood level raises the hope that similar preparations may be eventually forthcoming.

VIII. Varying the Frequency and Size of Dosage:

Following the development of biologic tests to determine plasma concentrations of penicillin accurately, and later general acceptance of a therapeutic threshold of 0.03 units per cc., there has developed a tendency towards attempting to maintain concentrations at or above this therapeutic minimum without consideration of duration of bacteriostatic effects.

It has recently been observed that "periodic peaks" of penicillin are probably adequate alone for many, if not most, gram positive infections. Experiments of Jawetz appear to show that the effects of penicillin on streptococcal infections in the mouse last much longer than measurable blood concentrations. Assayable levels persisted for only one hour after injection of the drug, while depression of bacterial population continued for eight hours or longer. Zubrod investigated the relative efficacy of different dosage schedules of penicillin in Beta hemolytic streptococcal infections of mice. He found that after treatment with multiple doses of aqueous penicillin, survival depends more on total dose administered than on the number of fractions into which the total dose is divided. Marshall states that the maintenance of a constant blood concentration is probably unnecessary for efficient therapy in the human. He believes that it should be possible to accomplish satisfactory therapy with aqueous penicillin given in three, two, or even one injection per day. After all, bacteriostasis is but a part of the recovery mechanism. Recently, large doses of aqueous penicillin given every 12 hours have been reported by several clinics to be very effective.

Levels so obtained may not be adequate to combat all bacterial infections. Sustained very high concentrations of penicillin (possibly augmented by "peak" doses) appear to be the best available direct method for attaching severe infections. Strain resistance to penicillin in vivo has rarely been observed as an acquired characteristic even following exposure to subcurative doses of antibiotics. Penicillin resistance usually develops slowly and is not a frequent clinical problem. Mixed infection more commonly explains what may seem like strain resistance. The need for unusual enhancement

of effects is, therefore, not common. When naturally resistant mutants are suspected, their presence must be sought in clinical judgment and biologic tests for strain susceptibility. The dosage and method of administration of penicillin should be planned in such a manner as to eliminate both susceptible and naturally resistant variants as rapidly and as completely as possible.

Streptomycin: Whether methods to delay absorption and suppress renal clearance are as effective for streptomycin as for penicillins is not yet definitely known. Kolmer and his associates found that streptomycin suspended in beeswax and peanut oil was not absorbed from the muscles as readily as penicillin and that maintenance of an effective concentration for six hours required the injection of more than 0.5 gm. per dose. They could not demonstrate suppressed urinary clearance by sodium benzoate when they gave 0.6 to 1.3 gm. of benzoate every four hours along with a single intramuscular injection of 0.25 to 0.5 gm. of streptomycin.

The effect of caronamide on plasma concentration was studied by Strauss in four human subjects. Results were not impressive, only one subject showing a slight rise, while three showed none.

Aerosol streptomycin has been reported to be effective in pulmonary infections; Heilman observed that practically none was absorbed, even though it was well tolerated and no evidence of irritation could be found. It would seem that additive effects could be expected, and that they may be needed more often because of the relatively more rapid development of resistance. Observation of its effect on human tuberculosis suggests that two relatively small (0.5 gm.) doses at 12 hour intervals are equivalent in effect to several more fractional doses, and are much less toxic.

Dr. Wegman: **Toxicity of Antibiotics**

By derivation and common custom, toxicity is used to refer to occurrence of untoward signs and symptoms produced by toxins or poisons. In relation to drugs and medications the term usually refers to undesirable side effects. Noxious is a broader term than toxic, however, and in this discussion toxicity will be considered as only one phase of the "noxa," or harmful effects of antibiotic therapeusis.

The noxa to be considered fall into four categories:

I. Promotion of resistant strains
II. Disturbance of bacterial balance
III. "Masking" effects
IV. Untoward reactions in patients

The first category has been discussed extensively by Dr. Alexander and I should like but to emphasize again the point she made, that indiscriminate use of antibiotics (and for that matter sulfonamides) without adequate indication and in insufficient dosage, can do harm not only to the individual patient but to other patients as well. In certain instances previously effective chemotherapeutic substances have lost all practical value because of the development of resistant strains. Unwarranted and unjustified use have certainly contributed to the development of this state of affairs. Not every infection needs or is benefited by treatment with chemotherapy or an antibiotic. Blanket recommendations for therapy are not always safe. One must evaluate each case on its merits, decide whether or not treatment is indicated, and then give it properly.

The second category of noxa has to do with possible disturbances in bacterial balance caused by antibiotic therapy. In a recent paper Weinstein reported five instances of intercurrent infection during penicillin or streptomycin therapy, four of them in young infants. While under penicillin therapy for pneumococcal pneumonia one patient developed a positive blood culture for H. influenzae and another a positive blood culture for Klebsiella pneumoniae. The converse was also true in that a patient under treatment with streptomycin for influenzal meningitis developed pneumonia due to Staphylococcus aureus. Weinstein offers the explanation that the other pathogenic bacteria were present in small numbers all the time, but that they were apparently "overgrown" by the primary pathogen. When, however, the primary pathogen was controlled by the antibiotic, the second unaffected organism flourished and invaded.

Several observers have noticed that diarrhea has appeared during the course of penicillin therapy and some have had the clinical impression that penicillin therapy when diarrhea was already present made the latter worse. This relationship requires further study before a definite conclusion can be made.

Whatever the explanation for this phenomenon, possible development of infection with another organism should be kept in mind in following courses of patients treated with specific antibiotics.

The third category of noxa was listed originally as "masking." What this usually means is not

that the drug has masked the disease but rather that it has put blinders on the doctor. With use of a specific drug, the patient's condition may ameliorate to such an extent that the physician fails to appreciate the significance of less striking signs and symptoms. The tendency of a physician to place too much reliance on these drugs is well known. We recently had a child with pulmonary consolidation; treatment with penicillin was begun promptly. A coexisting acute intussusception was not appreciated for the first 24 hours the child was in the hospital. One can't really blame such an occurrence on the drug, but it must be emphasized that nothing absolves the physician from close supervision of his patients—not even the "wonder drugs."

In considering the final category, during treatment an antibiotic agent is brought into contact with both the microbial agent and the human host. However selective these antibiotics may be it would be unique, indeed, if they were to be deleterious only to the microbial agent. As a matter of fact, Florey has pointed out that, in the almost three quarters of a century that experiments with antibiosis have been carried on, toxicity has always been the great barrier.

In the individual case it is often extremely difficult to distinguish between fortuitous occurrences and reactions causally related to specific therapy. Furthermore, the presence of intercurrent exanthematous disease may be confusing, but differential diagnosis should not be difficult if due regard is paid to history, careful physical examination and laboratory studies. Rashes which are probably allergic in origin may be caused by allergens in the drug itself, by impurities contained in a particular preparation, or by some other unrelated element in a patient's food or environment. It is to be noted that as these drugs have been further and further purified, certain reactions have been observed far less frequently. While this has helped to establish the role of impurities, it also means that interpretation of many earlier reports of toxic effects must be reconsidered.

There is general agreement that all of the various toxic reactions occur far less frequently in children than in adults. Though this may be heartening to pediatricians, it does not in any sense absolve us from always keeping in mind possible long-range noxious effects.

Specific toxic manifestations of penicillin and streptomycin vary sufficiently to warrant separate consideration. Where penicillin is concerned, it must be noted that by and large reactions are extraordinarily few. In mice a toxic dose is about 64 times an effective dose as determined by subcutaneous injections of crude penicillin. In other experimental animals there has also been a very wide margin of safety. Although there are quantitative variations between species and difficulties in relating animal studies to human beings, it is clear that human experience parallels experimental results. I know of no instance in the past year and a half in which we have been sufficiently concerned over a possible reaction to have stopped the administration of penicillin.

Reactions which have been reported most prominently are those which are essentially allergic in character—various skin rashes, angioneurotic edema, hydrarthrosis, or less typical general signs, such as malaise or headaches. It is with this type of reaction that the question is raised as to how much is due to the antibiotic itself and how much to associated impurities. While allergic reactions have certainly been far fewer since the material has been purified, it seems quite clear that penicillin itself can act as an allergen.

There are some curious things about allergy to penicillin. In many respects reactions are similar to those seen with other allergens, and may be immediate or delayed. Several reports have indicated that sensitization has been produced experimentally, that it has been demonstrated by passive transfer technics, and that desensitization can be accomplished. In contrast, others indicate that reactions bear no necessary relationship to previous administration of penicillin and that those who react at one time may not react at another. While there was a much higher incidence of positive skin tests for penicillin in those who showed presumably allergic manifestations, many did have negative skin tests. Conversely, positive skin tests occurred in patients who showed no signs of a reaction to penicillin. Quantitative and qualitative variations in impurities may explain some, but not all, of these inconsistencies. It is difficult to predict certainly when a patient is going to have a reaction or to foretell it by means of direct skin tests or passive transfer technics. If a patient has a reaction once, it is more likely that he will have it a second time; but, if an interval is allowed to elapse between treatment courses, the reaction may not appear or may be very mild. The decision whether to give penicillin depends more on evaluation of patient's need than fear of allergic reaction.

When administered intrathecally, penicillin apparently can act as a direct irritant. How much irritation is produced is related to concentration, size of dosage and presence of impurities. The effect has been noted in both animals and human beings with pure crystalline, amorphous, or earlier

impure forms of penicillin. In general, such reactions are not likely to occur if the amount given intrathecally at any one injection is limited to 10,000-25,000 units.

The febrile Herxheimer reaction observed during treatment of syphilis has often been considered a helpful sign of therapeutic efficacy and perhaps may not be properly called "toxic." Dr. Platou has found that 39% of syphilitic children showed such a reaction. In no instance was it serious enough to interrupt therapy, and in relation to the overall plan for the treatment of congenital syphilis it does not seem necessary to reduce the size of early doses provided the general recommendation of dividing the total dose into at least 100 injections is followed. Dr. Platou tells me also that analysis of his data for febrile reactions in 209 infants indicates that a febrile rise of one degree or more after treatment may be expected in about 25% of the cases, and that such a rise is more frequent in the youngest infants and in those most seriously ill with syphilis.

With streptomycin, though actual experience is still limited, reactions are of greater importance. Experiments on both animals and man indicate that reactions are more frequent than with penicillin. McDermott has separated reactions into five main groupings:

1. "Histamine-like": these are largely of historic interest since they appear to have been associated almost entirely with impurities.

2. Anaphylactic phenomena: these include fever, rash, and eosinophilia. The first two follow the usual character of drug reaction and present the same problems mentioned in connection with allergic reactions to penicillin. Eosinophilia, however, may present a more serious problem. While it is possible that this finding may be a "therapeutic" rather than a toxic reaction and as such be an indication of efficacy, the work of Rich on drug sensitivity indicates that eosinophilia may portend future diffuse vascular disease. McDermott found that eosinophilia was present in 14 of 16 patients, that it varied from 5% to 40% and lasted from one or two weeks to as long as 60 days to 100 days. It disappeared completely following cessation of treatment, and should not be construed as a deterrent to continued therapy. These patients should, however, be re-examined at intervals for a long time in the future.

3. Topical application to the central nervous system, as with penicillin, may be very irritating. Purity and dosage seem to be important determining factors. In animals and in some human beings, large doses have been followed by stupor, convulsions, and paralysis. Since intrathecal use is generally limited to cases with purulent meningitis, it is rather difficult to decide what phenomena are related to the disease and what to the drug. In infants under one year, with tuberculous meningitis, we have used 50 mg., once or twice daily, with apparent impunity, although in one case questionable weakness of one arm appeared. It has been suggested recently that the intrathecal dose of streptomycin be dropped to the level of 1 or 2 mg./kg. body weight. Since there is considerable question as to the reversibility of toxic reactions in the central nervous system, it is probably better to interrupt treatment if serious manifestations occur, and to resume later with caution.

4. Renal dysfunction: casts and albumin have been discovered in the urine of most patients receiving streptomycin. The finding has been particularly marked in an acid urine, and alkalinization has resulted in improvement. The lesion is apparently completely reversible and no hematuria attributable to streptomycin has been reported. In some cases there has been evidence of nitrogen retention but these cases have been limited almost exclusively to those patients having previous kidney damage.

5. Involvement of the eighth nerve: the main disturbance, vestibular dysfunction, seems to be relatively common and related to length of treatment and, to a lesser extent, size of dose. It has been noted as early as four days, but may not appear until the second or third month after treatment. While this finding has been reported frequently in adults, it has not been noted so often in children, probably because of greater difficulty in establishing the existence of such a dysfunction in a small child. Dr. Alexander has made it clear that vestibular dysfunction can be demonstrated in very young infants if looked for carefully. Adults apparently compensate for this difficulty fairly rapidly, but it is not yet clear to what extent, if any, the process is reversible even though most overt symptoms disappear within two to three months after cessation of therapy. Deafness is considerably less common and usually seems to be associated with very high doses, pre-existing central nervous system disease, or renal damage associated with very high blood levels. Even if this process may be partially reversible, some permanent residua may be expected. Dr. Alexander has emphasized short periods of treatment, but in tuberculosis, where treatment must be continued, no way of avoiding

injury to the eighth nerve is apparent at present. Again it becomes a question of evaluating the patient's need for the drug. In a disease like tuberculous meningitis or miliary tuberculosis, it seems justifiable to continue medication regardless of this hazard.

Earlier reports included no evidences of harmful hematologic effects but recent reports have indicated rare cases of agranulocytosis and thrombocytopenia. If these are severe and the relationship established, the drug should be stopped.

In the recent joint report from the Army, Navy, and Veteran's Administration it was noted that toxic manifestation of sufficient severity to require cessation of therapy had occurred in about 6% of over 800 adult patients. This, however, excludes patients with miliary or meningeal tuberculosis.

Consideration of the various noxa, general and specific, attendant on antibiotic therapy, must stimulate physicians to evaluate carefully the need and indications before instituting treatment.

Discussion:

Dr. A. R. Eveloff, Springfield, Ill.: Does the duration of symptoms, before beginning treatment of influenzal meningitis or tuberculosis, influence the dose of streptomycin to be used?

Dr. Alexander: I should advise against increasing the dose of streptomycin above that already outlined by Dr. R. V. Platou; injury to the vestibular apparatus occurs in a significant per cent treated according to this schedule. If H. influenzae meningitis has progressed to the point of exhibiting signs of severe infection as evidenced by a sugar concentration of 15 mg./100 cc. spinal fluid or below the patient should receive sulfadiazine in addition, no matter what the duration of symptoms. In infants of six months or less, specific rabbit serum should be used also. In tuberculous meningitis, the results with the use of streptomycin alone are so disappointing that one or both of the other agents, found to be active against the tubercle bacillus; such as, promizole and para-aminosalicylic acid, should be used in addition. One cannot be guided by duration of symptoms.

Dr. F. B. Schley, Columbus, Ga.: How long should streptomycin be continued in tuberculous meningitis, and how often should it be given intrathecally?

Chairman Platou: It isn't possible to answer either question accurately. Among nine patients we know of who have apparently recovered from tuberculous meningitis, therapy has been continued for periods varying from 58 to 120 days. The daily amounts have varied from .05 to .15 gm. of streptomycin per kilogram. Intrathecal injections have been given from 14 to 120 times at intervals of from 12 to 48 hours, in single doses of from 50 to 100 mg. What is optimal, what is ideal, or what should be done we don't yet know.

Dr. W. L. Chadwick, Denver, Colo: What about penicillin in diphtheria—does it reduce the necessary dosage of antitoxin?

Dr. E. S. Platou: This is a very good question because a great deal of work has been done to show how effective penicillin is in this situation. During the war, Dr. Karelitz did some very nice work in the Western Theatre, which strongly suggested that penicillin was effective in uncomplicated diphtheria and further, that it had some effect in the carrier state. As far as reducing the dosage of antitoxin is concerned, my personal opinion would be that it should not do this. We should depend primarily upon antitoxin for the cure of diphtheria.

Dr. Alexander: I think another viewpoint should also be expressed here. When Dr. Karelitz presented his work before the American Pediatric Society about a year ago, Dr. Horace Hodes, who is in charge of the infectious disease hospital in Baltimore, stated that their experience was not in agreement with that of Dr. Karelitz—that evaluation depended a great deal on how many cultures were taken and the methods used; their experience indicated that it was very disappointing in elimination of the carrier state.

Dr. D. J. Pachman, Chicago: What criteria are used to stop therapy in influenzal meningitis?

Dr. Alexander: There are two effective ways of treating influenzal meningitis now, and this question has to be discussed from both of these points of view. Let's limit our discussion for the moment to severe H. influenzal meningitis. One has a choice of two different treatments, either sulfadiazine and type-specific rabbit-antiserum on the one hand, or streptomycin and sulfadiazine on the other. In the first one we are able to give the total dose of serum needed in one administration and test the patient's serum to maintain an adequate excess of antibody throughout the period of active infection. If the patient's serum after the initial dose continues to show an excess, no further serum is needed; sulfadiazine is then discontinued one week after the first sterile spinal fluid is obtained. When one treats with strep-

tomycin and sulfadiazine, one is confronted with the fact that toxic effects of streptomycin are closely related to the duration of therapy. There is no question about that. With the experience of a number of others showing the frequency of damage to the eighth nerve, we reduced our treatment with streptomycin to a maximum of four days, feeling that such a period would be entirely without risk, but unfortunately we have had some cases with complete loss of vestibular function as a result of even four days of streptomycin therapy given both intrathecally and intramuscularly. We're now in the process of attempting to determine whether an even shorter period of treatment would be effective in eliminating the infection. Laboratory evidence suggests that a shorter period will be effective, since streptomycin works quite rapidly, and we have reason to believe we might be able to reduce it to 24 or 48 hours. That has not yet been determined; unless we can show that streptomycin will eliminate the infection during a period of treatment which is entirely safe, I believe we will have to discontinue this agent in the treatment of influenzal meningitis since it appears that the agent must be introduced intrathecally, which increases the danger of vestibular damage. Sulfadiazine in this treatment plan may also be discontinued seven days after the first sterile spinal fluid is obtained.

Vestibular damage, which is the most serious toxic effect and the most frequent, apparently is greatly enhanced by intrathecal treatment. If one uses it only intramuscularly it is unusual to have vestibular damage unless the drug is continued for a period of more than two or three weeks. In tuberculous meningitis the risk of vestibular damage is necessarily great and one has to weigh the danger from the disease against the toxic action of streptomycin.

Dr. J. E. Brown, Jr., Columbus, O.: What is the danger of using sulfadiazine or penicillin ointments with relation to future sensitivity?

Dr. Wegman: What limited data there is would seem to indicate that there is a greater or more likely possibility of sensitivity from the use of such preparations on mucosal or skin surfaces. I can recall at least one patient who did have this type of reaction who on subsequent administration of the sulfonamide did not show any skin sensitivity. My own experience with this problem is too limited to go further.

Dr. Brown: Do you think that a caronamide-penicillin combined tablet will simplify oral administrations in the future?

Dr. E. S. Platou: Caronamide has a rather limited usefulness. To combine it with penicillin in a tablet would make a pretty good sized tablet.

Dr. K. W. A. McCleod, Flint, Mich.: Do you advise routine administration of penicillin or sulfadiazine for prevention of rheumatic recurrence, or only during acute respiratory episodes?

Dr. Wegman: We employ sulfonamide only prophylactically in rheumatic fever patients and give it with reservations.

Dr. William Weston, Jr., Columbia, S.C.: Do you think you can maintain blood levels with penicillin after initial dose at three hour intervals during the day by giving 100,000 units every six hours at night?

Dr. E. S. Platou: Penicillin in dosage of 100,000 units twice daily is quite adequate for almost all penicillin-susceptible organisms.

Dr. Jerome Weaver, Birmingham, Ala.: In the face of drug resistance mentioned, would single daily intramuscular injections of penicillin be advisable in less severely ill patients with infections being treated at home with sulfonamide drugs?

Dr. Nelson: As far as the long range view of this problem is concerned, the answer is in the affirmative; the emergence of resistance would be discouraged by using two agents under these circumstances. This is a relatively severe infection, so that the two agents in addition to discouraging emergence of resistance would also have a better therapeutic effect.

Dr. J. A. Lichty, Denver: Is it impossible to predict the success of streptomycin treatment in H. influenzae by studying the initial culture before treatment? If so, would we have any more luck studying cultures obtained after 24, 48 or 72 hours of treatment?

Dr. Alexander: When streptomycin is used as the only therapeutic agent, sensitivity tests on the organism isolated before treatment do not enable us to predict the success of this therapy. However, severity of infection as evidenced by the concentration of the spinal fluid sugar, has served as a good index. On the other hand, study of the organism isolated after treatment provides the answer. If such a culture resists the action of high concentrations of streptomycin one can predict failure of this antibiotic to eliminate the infection.

Dr. C. H. Webb, Shreveport, La.: If mutants are always present, and are responsible for development of resistance to antibiotics, is it best to treat any severe infection with combined therapy (not H. influenzae alone)?

Dr. Alexander: Yes, the combined action of two effective agents, which act by different mechanisms, is definitely indicated in all severe infections.

Dr. J. D. Craig, New York City: What are the results of use of penicillin or streptomycin in pertussis?

Dr. Alexander: There is no evidence that penicillin is effective in pertussis. The use of streptomycin for treatment of this infection is still in the experimental phase, but the results suggest that the course of the disease is influenced in a favorable way.

Dr. M. V. Adams, Mobile, Ala.: Would you advise discarding the use of silver nitrate instillation in the eyes of newborns in favor of penicillin?

Dr. Nelson: This may be advisable, but present data does not justify universal adoption of the plan.

Dr. P. E. Williams, Hamilton, Ont.: Does the daily prophylactic use of sulfonamide increase resistance of the organisms?

Dr. Alexander: Yes, there is every reason to believe that prophylactic use of sulfonamides, by elimination of sensitive members, allows the more resistant ones present to reproduce; through the appearance of mutants with increasing resistance, the organism can emerge as a highly resistant strain. This was occurred during the prophylactic use of sulfadiazine for streptococcus hemolyticus infections.

Dr. P. Herzog, Kenosha, Wis.: Would damage to the eighth nerve following streptomycin therapy be of a temporary or permanent nature?

Chairman Platou: So far as we know at present, there isn't any real evidence that effects on the eighth nerve are reversible. On the other hand, a great deal of time hasn't passed since the first cases were treated, tests of vestibular function havn't been routinely done, and young subjects apparently learn to accommodate rather quickly.

Dr. R. A. Craig, Kokomo, Ind.: Will continuing penicillin several days after the acute stage of an infection increase the likelihood of a resistant strain being developed? Isn't it as important to know when to stop treatment as when to start it?

Chairman Platou: Dr. Alexander's suggestion is a good one—a culture taken after therapy has been initiated will give us an excellent lead. Whether to stop the antibiotic is best determined by the condition of the patient and by careful evaluation of follow-up cultures.

Chairman Platou: Summary.

Because the participants have covered their assignments so well, a complete summary is not necessary, though it seems fair to hazard a few tentative conclusions based on our discussions.

(1) No more than the broadest kind of generalizations for dosage schedules of penicillin or streptomycin are permissible at present. To serve the best interests of patients, therapy directed against any infectious agent must be individualized. Specific means for such individualization are available, and deserve wider application.

(2) Probably all pathogenic micro-organisms have a number of similar mechanisms for combatting the injurious effects of antibiotic agents; some of these mechanisms have been discussed, others undoubtedly remain to be elucidated. The greatest single limiting factor for effective use of streptomycin is emergence of resistance. Some resistant organisms are probably present in any bacterial population; it is important that these be eradicated by adequate therapy at the earliest possible moment.

(3) Toxic effects of penicillin are relatively minor in contrast to those of streptomycin; the danger of streptomycin therapy should be very carefully weighed against the patient's need before this agent is used.

(4) Means for increasing and prolonging effective levels of antibiotic agents in body fluids at present have limited practical value, but may be of value in specific situations.

(5) Clinically, "the trend" in the treatment of most infections with antibiotic agents is to increase the individual and total dosage, increase the interval between doses, reduce the number of doses and the total duration of therapy. By the very mechanism of their action, these agents should never be used to "taper off" an effective clinical response. They are rarely justified for minor infections or for an all too common indication, "just in case."

Pediatrics

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SPECIAL FEATURE SECTIONS

THE PEDIATRICIAN AND THE PUBLIC

EDWARDS A. PARK, M.D., *Editor*

FROM what Dr. London reported in his paper "The North Carolina Plan for Improved Medical Care," published in this Section last month, this reader concludes that North Carolina is, as is stated, truly "in the vanguard" not only "with respect to advancement of medical education and expansion of medical care facilities," but with respect to sound policies and procedures to be used in planning for and achieving such advancement. Those worthy of particular notice are:

1. Leadership shared by lay and medical persons: Thus, in contrast to some other medical care plans where only doctors sit in on planning and administering programs, representatives of all those concerned were in from the beginning in the North Carolina plan. Doctors, educators, leaders in industry and government, farm and labor groups, consumers of medical care, etc., helped make initial plans. Lay as well as professional personnel constitute this State Commission which now adopts policies and administers funds.

2. Careful study of facts as plans were developed: It should be emphasized that the studies took special cognizance of the economic status of the population and the availability of services they needed.

3. The steps taken to solve the problems uncovered by the studies were realistic and designed to attack those problems which were solvable in the near future. Thus the problem of lack of well trained personnel was faced and three important steps were taken to solve it. A medical school is being expanded. Loan funds are made available so students can go to universities. Post-graduate education is being expanded through consultations for physicians less well trained and in smaller hospitals. Another problem faced quite realistically was that the best modern medical care demands more than the average doctor or small hospital can supply. Apparently some assistance in solving this problem will be given by having consultation services supplied from larger and better staffed units. The development of additional diagnostic services within reach of the patient and the doctor in rural areas will also help.

4. Integration of curative and preventive services as apparently envisaged by the development of combined hospital and health center units where the usual public health activities and hospital activities may be carried on.

5. Operation of the program on as nearly a local level as possible: It is of interest that apparently intelligent use was made of local assets as for example, the financial

aid available through the Duke Foundation. Nevertheless, it was also clear that additional state and federal funds were needed to enable local communities to give the services needed.

If one looks at the difficulties often experienced in other communities when efforts are made to improve medical care, one wonders how North Carolinians developed a point of view that allowed this progressive program to be set up. Was the need, as shown by the facts, so great that there were no other answers? How did the medical profession, so often afraid to plan medical care with lay groups, happen to ask for their help? How were the problems often created by overlapping jurisdictions of governmental units solved? How were the jealousies of various vested interest groups adjusted? Of how much help was the state Academy of Pediatrics study? How did they come to grips with practical problems, avoid the all-too-common polemics over "state" medicine or tendency to adhere to the status quo?

Colorado has recently made progress, but one has an impression of the great contribution made there by the dynamic Dr. Florence Sabin. True, she, too, won battles through careful garnering of the facts and colorful presentation of them to politicians, lay and professional groups, industrial and union leaders. Was there such a leader in North Carolina, or what was the ferment that put it on the move?

Dr. London's account is too meager to answer these questions or others that arise quickly when one tries to envisage how the plan will operate and if a similar plan could operate elsewhere. For example, how will high standards of medical care be maintained? The account states that the State Hospital and Medical Care Commission will adopt "policies designed to maintain the highest standards of service." But elsewhere one reads that "any hospital receiving aid should remain under the professional, administrative, and financial control of its own board of trustees." How are these two policies carried out? Does the poor hospital which makes no attempt to improve its service continue to receive state and federal financial aid? How does the State Commission use the standards its professional advisers establish? It is also not clear how much of a role a well-established institution like the School of Medicine at Duke University will play in the scheme. Again one wonders how the "Good Health Association" which was so active in securing the forty-eight million dollars necessary to get the plan started will operate in the future. Will its potential power in enlisting the interest of large segments of the population be used in furthering health education for all the population? If so, how? North Carolina has in recent years developed some of the most progressive health education programs in this country so one would suspect that a good continuing program of public support for medical care and health education were already under way but it is important that more be known of them.

In fact, the progress made in improving medical care for all citizens of North Carolina in the past four years deserves closer study than this report allows. We all will face similar problems when our localities decide to provide adequate health and medical care for all the population. Here is a report of progress that demands our careful consideration.

LEONA BAUMGARTNER, M.D.

The North Carolina Plan for Improved Medical Care presents a comprehensive and progressive attack on the problem of distribution of medical care and improvement of health.

The successful cooperation of such a large group of citizens of a state indicates that

they are aware of the need for planning and a willingness to solve health problems on a local basis. The merits of the plan are:

1. Local control and support of medical facilities. The community contributes its share of funds to the program.

2. The state supports local efforts in the interest of education and coordinated planning.

3. Federal contributions are accepted from funds available for hospital construction and expansion of public health facilities provided the administration of services remains the right of the local community.

4. An attempt is made to decentralize hospital and medical service by supporting hospitals and health centers in smaller communities.

5. Recognition of the idea that better medical care comes from better medical education is a premise of the plan. Continuous support of the physicians in smaller communities in the form of diagnostic facilities, consultation and continuing post-graduate work should aid in improving medical care.

6. Better distribution of physicians in the state should be a result of the expanded medical school program, the teaching hospital and opportunities offered by the student loan fund.

7. State and voluntary aid to assist the local communities in care of the needy.

8. Coordination of existing public and voluntary agencies to avoid overlapping and also to prevent dictation to the local communities.

9. Inclusion of the public and press to further the knowledge of what constitutes good health and medical care.

10. Leadership in the development and prosecution of the North Carolina Plan rests with the medical profession and should stimulate it to continue its efforts.

The evolution of this type of planning will necessarily involve:

1. Improved living conditions, housing, sanitation, nutrition and education toward the goal of good health.

2. An extended program of disease prevention.

3. Increased hospital and medical care insurance on a voluntary basis.

4. A continuous program of education and publicity in the interests of improved medical care.

5. An awareness that centralized planning should not develop into centralized or political domination.

The citizens and medical profession of North Carolina have shown remarkable foresight in their realistic approach to the problem of improved medical care. The plan is based on surveys and study of the needs in the state.

It is evident why North Carolina was chosen to be the site of the pilot study in the study conducted by the American Academy of Pediatrics.

This initial study should be a guide to other sections of the country in solving their problems of improved medical care. It is a more rational approach for American citizens than the emotionally inspired propaganda to which the public has been subjected for several years.

VERNON W. SPICKARD, M.D.

TRENDS

IN HEALTH LEGISLATION AND ADMINISTRATION

JOHN P. HUBBARD, M.D., *Contributing Editor*
Washington, D.C.

This and subsequent descriptions of events and trends are intended to be unbiased and factual, presenting both sides of controversial matters so that conclusions may be formed from critical appraisal of things as they are. These statements do not necessarily reflect the opinion of the writer nor are they to be interpreted as official opinion of the Academy.

AS OF present writing (January 9, 1948) Congress has reconvened and President Truman has come before a joint session of both houses with renewed and vigorous support of a national health insurance program. But Congress is Republican and Senator Taft has declared his determination to fight his Republican health program (S-545) through Congress, despite what he has termed "increasing propaganda activity" in behalf of the Wagner-Murray-Dingell Bill (S-1320). And, it should be remembered, Senator Taft is chairman of the Committee on Labor and Public Welfare which will decide upon the health bills to be reported to the floor of the Senate during ensuing months.

Last month when we reviewed the Wagner-Murray-Dingell Bills (S-1606 and S-1320) and the Taft Bill (S-545), we stated that "it is unlikely that either a comprehensive Democratic or Republican health program will be acted upon in this session of Congress." This prediction still looks good. It is a reasonably good guess that the Taft and the Wagner-Murray-Dingell Bills will deadlock in Committee hearings early in the year. We may then expect to see a less controversial measure reported out of Committee favorably so that those seeking re-election in the fall can claim achievement in relation to the health of the people. The cause of child health is always popular. Therefore, the School Health Services Bill (HR-1980 and S-1290) may play the role of a compromise bill unless it can be demonstrated that some other approach to health legislation is preferable.

This School Health Services Bill was first introduced about a year ago by Representative Howell. Shortly thereafter, Senator Saltonstall introduced a companion bill (S-1290). The purpose of this legislation is "to establish a national policy under which American children could not be permitted to grow up with physical or mental defects which could be prevented or corrected in childhood." One of its essential features would be to supplement routine physical examinations for school children with some provision for follow-up medical care to correct defects and conditions likely to interfere with normal growth, development, and educational progress.

The bill would establish a new grants-in-aid program administered by the Children's Bureau "to cooperate with each State in providing and maintaining school health services for the prevention and diagnosis of physical and mental defects and conditions, and (especially in rural areas and in areas suffering from severe economic distress) the treatment of such defects and conditions."

In HR-1980 it is proposed to finance the program by an appropriation of $12,000,000 for the first year, $18,000,000 for the second year, and for each succeeding year, as much as might be necessary to carry out the purposes of this legislation. Senator Saltonstall's bill, which is essentially the same, calls for a somewhat smaller appropriation:

$10,000,000 for the first year and $15,000,000 for the second year. Both bills propose that half of the State allotment should be unmatched and half matched with consideration given to the population of school age children and high per capita grants for the less wealthy States. Of the sum appropriated each year, $2,000,000 would be available to establish demonstrations, to train personnel for State and local school health services through grants to schools of public health and other professional institutions, and to administer the program.

Each State before receiving any funds would have to prepare a plan in accordance with certain conditions specified in the bill. Included in these conditions is provision for follow-up medical treatment of defects revealed by the routine physical examinations. Also the State plan is to be administered by either the State health agency or the State education agency according to State law, but the plan must be concurred in by both agencies. Thus each State would determine how health and education authorities would cooperate in making health services available to school children. Each State would draw up its own plan according to its own needs.

State plans would be submitted for approval to the Chief of the Children's Bureau, acting with the advice of a board composed of the Chief of the Children's Bureau as chairman, the Commissioner of Education and the Surgeon General of the Public Health Service. In addition to this Board, a National Advisory Committee on School Health Services consisting of twelve members would be created to advise on the administration of this program.

Hearings on these bills have so far been very limited. In the House, hearings were held on only one morning (July 16, 1947) by a special health sub-committee of the Interstate and Foreign Commerce Committee. In the Senate, hearings have not yet been scheduled by the Committee on Labor and Public Welfare to which the bill has been referred. Although brief and limited mostly to statements presented by the principal sponsors of this legislation, the testimony has been sufficient to bring out certain important controversial points, the two most important of which are: (1) the division of responsibility between health and educational authorities and (2) the inclusion in both bills of the two words "and treatment" which provide for medical service related to the correction of defects discovered during the course of school examinations.

At the national level, the administration of the program is placed primarily in the hands of the Children's Bureau, which is directed to utilize the services of the Office of Education in matters involving State education agencies. These agencies—the Children's Bureau and the Office of Education—have not yet reached full agreement on the division of administrative responsibility, but since both are in the Federal Security Agency the way is clear for the development of a workable plan.

At the State level, the situation is not so easy. In many States school health services are by State law under the administrative direction of the education agency, although there is general agreement among educational agencies that medical care is the responsibility of the health officials. When now it is proposed that health services should be extended, we hear the voice of state health departments arguing that jurisdiction in these matters should belong solely to them. The Association of State and Territorial Health Officers and the American Public Health Association, both supporting the bill, recommended to the House Committee that in due course—by 1950 or 1955—administrative control at State and local levels be in the hands of the official health agency. More

recently, however, the School Health Section of the A. P. H. A. has been attempting to arrive at less uncompromising attitudes acceptable to education agencies.

The second major controversial issue, arising from the words "and treatment," is fundamental to the purpose of the bill. It is now a widespread practice to require physical examination of school children. Most States already have laws permitting or requiring physical examination of children in school. Where current practice fails to meet existing need is in providing for the necessary medical care to correct defects revealed by the examinations. It is at this point that the proposed legislation intends to fill the gap; and it is also at this point that government impinges upon the private practice of medicine.

It must be admitted that striking out the provision for follow-up care or treatment would result in an emasculated bill which would accomplish nothing. For example, dental caries is undoubtedly the most prevalent defect among school children today. The solution of this problem does not lie in more physical examinations to reveal more cavities, but rather in more and better remedial service so that children can have their cavities properly filled.

Seeking to limit too broad an application of the words "and treatment" without killing the bill, Dr. Wall, acting as chairman of the Legislative Committee of the Academy, was responsible for writing into the bill a significant clause emphasizing treatment "especially in rural areas and in areas suffering from severe economic distress." This clause seeks to assure that the available funds will be used where needed most and at the same time avoids specific mention of a means test. Since the bill is silent in respect to a means test, it is left up to the individual State to determine how this clause is to be interpreted. A State is free to introduce a means test into its plan or to leave it out. The question of a means test will undoubtedly be the cause of lively discussion in the forthcoming hearings. On the one hand, we will hear the argument that health services should not be withheld from a child because his parents are more wealthy than those of a child sitting at the next desk. On the other hand, it will be pointed out that an appropriation of $12,000,000 to $15,000,000 is woefully inadequate to meet the need of medical care for children of school age, that safeguards are necessary in order to assure that the available funds will be used where needed most, and that if the appropriation should be increased in subsequent years, as allowed in the bill, sufficiently to meet the entire need, the government would then become seriously involved in the practice of medicine in competition with private practice.

One safeguard now in the bill and generally agreed upon, results from adherence to the principle that each State should be responsible for working out its own plan. The application of this principle is stated very well by Senator Saltonstall in his testimony before the House Committee: "This does not provide just an examination of the child, it provides some follow-up. The question, of course, of how far to follow up is a serious problem, but it seems to me that we have got to leave that up to the local administrator. My main feeling as a former State official, and now as a Government official, is that the Federal Government must in these days give financial assistance to local and State governments on certain social problems to use the word in its broadest sense; but I hope and trust that when we pass these laws, we will not try to tell the local administrator just how he shall do it, but we shall give him advice. If he lives up to certain standards, then he gets our help. From there on, he goes it alone and he goes it in a way that he thinks is the best for his State and for his locality."

A Department of Health, Education, and Security of Cabinet status as proposed in S-140 is increasingly likely to receive early action. It has already been favorably reported out of committee but has not yet reached the floor of the Senate for consideration. Mr. Oscar Ewing, Federal Security Administrator, has come out strongly for elevating his agency to cabinet rank and has let it be known that he would not object to a cabinet post himself. The AMA has opposed this move on the grounds that the health activities of the nation should not be thrown in with welfare and security activities under a non-medical cabinet officer. The AMA favors an independent national health agency without cabinet rank as provided for in the Taft bill (S-545).

Federal funds for medical education are being proposed with increasing vigor. Dr. Parran has recommended that the Public Health Service, and other medical services as well, should consider a system of scholarships given to a sufficient number of medical students to insure that the future federal need for doctors will be met. He states that: "So far as the Public Health Service is concerned, I am convinced that some such system is essential. I suggest that such scholarships be awarded on a wide geographical basis. The candidate might be nominated by the Senators and Congressmen. . . . A plan such as this might be broadened so that the student if not required for active duty in the Service, would fulfill his obligation to the government by employment in a state or local health service, or even as a final choice, by practicing in an area of his state designated as a deficient area by the appropriate state authorities." In agreement with Dr. Parran's proposal, the Association of State and Territorial Health Officers has gone on record officially recommending that the U. S. Public Health Service and the U. S. Children's Bureau study the problem of training and make plans to subsidize medical schools, schools of public health, and training centers, as well as for scholarships to a reasonable number of students for the purpose of increasing the number of personnel in all fields of medicine and public health.

Federal support of scientific research, inseparable from medical education, has also gained considerable momentum during recent months. The report to the President on the Nation's Medical Research submitted by Steelman's Committee points to the financial crises existing today in medical schools resulting from rising costs and decreasing income from endowments, grants, and gifts. "New money," the Committee states, "in addition to expanding public support of medical research, must be forthcoming to support the teaching function in graduate schools. . . . As quickly as possible, national expenditures for medical research should reach $300,000,000 annually—nearly three times the present rate. Most of this expansion must come from public funds." Those with further interest should read with careful attention Volume V of the Steelman Report. This volume, which deals with medical research, may be obtained for 25 cents from the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D.C.

PUBLIC HEALTH, NURSING AND MEDICAL SOCIAL WORK

LEONA BAUMGARTNER, M.D., *Contributing Editor*

INCIDENCE OF COMMUNICABLE DISEASES IN THE UNITED STATES NOVEMBER 30-DECEMBER 27, 1947

The accompanying table summarizes the incidence of nine important communicable diseases, based on weekly telegraphic reports from State health departments. The reports from each State for each week are published in *Public Health Reports* under the section "Incidence of Disease."

NUMBER OF REPORTED CASES OF 9 COMMUNICABLE DISEASES IN THE UNITED STATES DURING THE 4-WEEK PERIOD NOVEMBER 30-DECEMBER 27, 1947, THE NUMBER FOR THE CORRESPONDING PERIOD IN 1946, AND THE MEDIAN NUMBER OF CASES REPORTED FOR THE CORRESPONDING PERIOD, 1942-46

Division	Current period	1946	5-year median	Current period	1946	5-year median	Current period	1946	5-year median
	Diphtheria			Influenza[1]			Measles		
United States	1,291	1,416	1,416	14,500	11,686	11,686	15,344	9,902	10,381
New England	40	104	50	14	30	102	359	2,816	2,081
Middle Atlantic	126	196	127	47	60	121	2,567	3,327	3,327
East North Central	143	197	197	112	167	341	5,668	965	1,655
West North Central	99	128	124	86	112	151	2,077	102	435
South Atlantic	328	257	248	4,517	3,734	3,755	1,325	1,343	563
East South Central	149	207	166	688	333	662	147	134	224
West South Central	218	153	272	7,911	6,100	7,444	1,169	213	316
Mountain	122	74	68	716	1,065	1,065	836	563	685
Pacific	66	100	116	409	85	237	1,196	439	1,164
	Meningococcus meningitis			Poliomyelitis			Scarlet fever		
United States	224	248	498	360	688	932	7,167	8,257	10,982
New England	16	18	39	9	36	16	616	898	1,172
Middle Atlantic	40	47	115	49	81	52	1,435	1,797	2,122
East North Central	28	41	99	97	178	50	2,017	2,566	2,913
West North Central	18	16	34	16	128	41	745	644	1,190
South Atlantic	33	41	87	48	49	29	636	664	1,089
East South Central	21	24	54	15	32	11	381	333	481
West South Central	32	25	43	19	61	34	245	188	392
Mountain	8	9	25	55	19	19	394	407	640
Pacific	28	27	71	52	104	87	698	758	1,128
	Smallpox			Typhoid and paratyphoid fever			Whooping cough		
United States	13	7	28	221	166	217	9,667	8,709	7,297
New England	0	0	0	16	14	16	1,257	1,044	1,068
Middle Atlantic	0	0	0	39	21	29	1,794	2,289	2,024
East North Central	4	1	6	17	20	30	2,094	2,348	1,671
West North Central	7	4	9	10	7	7	664	267	306
South Atlantic	2	0	1	37	26	39	1,270	1,065	932
East South Central	0	0	3	13	22	22	421	346	346
West South Central	0	2	4	60	23	43	1,007	770	691
Mountain	0	0	2	11	21	14	586	243	251
Pacific	0	0	0	18	12	13	574	337	544

[1] New York, North Carolina, and Pennsylvania excluded; New York City and Philadelphia included.

Data furnished by the Division of Public Health Methods, United States Public Health Service.

Diseases Above Median Incidence

Influenza.—For the 4 weeks ended December 27 there were 14,500 cases of influenza reported. The median incidence for the preceding 5 years (1942-46) was 11,686 cases. The current high incidence of this disease is still confined largely to 3 States: Texas (6,664 cases), South Carolina (2,013), and Virginia (1,992). Only 3 other States have reported more than 100 cases weekly—Alabama, Arizona, and California. Few cases are being reported from the North Atlantic and North Central sections.

According to reports received from State officers there was no indication of a widespread influenza epidemic. There have been press reports of outbreaks of "colds" in some localities and an outbreak of undetermined respiratory infection, later identified as type A influenza virus, was reported in Los Angeles with 200,000 persons attacked. Later press reports say that the schools in certain sections of Texas have been closed on account of an undetermined respiratory disease, which may account somewhat for the increase in the number of cases of influenza in that State from 1,498 during the preceding week to 2,015 for the week ended December 27.

The number of cases of influenza for the year 1947 was higher than in 1946 but it was lower than in any of the 3 preceding years. The minor epidemic of 1947 did not start until March and it was midsummer before the number of cases had dropped to a normal level.

Measles.—The number of cases (15,344) of measles reported for the current 4-week period represented a 48% increase over the median for the preceding 5 years. During the early part of 1947 the incidence of this disease was considerably below that of 1946, but during the last 3 four-week periods of 1947 the cases have exceeded those reported for the corresponding periods in 1946 and for the 4 weeks ended Decmber 27 the number of cases was the highest since 1943 when approximately 30,000 cases were reported for the corresponding weeks. During most of the year, however, the incidence was below the normal seasonal level, and the number of cases reported for the year was less than 40% of the median for the years 1942-46.

Typhoid and paratyphoid fever.—During the 4 weeks ended December 27 there were 221 cases of these diseases as compared with 166 for the corresponding period in 1946 and a median of 217 cases for the preceding 5 years. The West South Central section reported the largest excess of cases, due largely to the occurrence of 30 cases of paratyphoid fever in Oklahoma. Pennsylvania reported 26 of the 39 cases of typhoid fever occurring in the Middle Atlantic section. In other sections the number of cases either was not significantly higher than the 1942-46 median or fell below it. Although the number of cases during the last 4 months of 1947 exceeded those reported during the same months of 1946 the total number of cases reported for the year 1947 will probably be the lowest on record for these diseases.

Whooping cough.—This disease continued at a relatively high level, the 9,667 cases reported for the current 4-week period being 1.1 times the 1946 incidence and 1.3 times the median for the 5 preceding years (1942-46). Each section of the country except the Middle Atlantic reported an increase in cases over the normal seasonal expectancy. This disease has maintained a relatively high incidence throughout the entire year and the number of cases (153,505) was the highest since 1943 when approximately 176,000 were reported. The annual 5-year median expectancy was about 123,000 cases.

Diseases Below Median Incidence

Diphtheria.—The incidence of diphtheria dropped again to a relatively low level, the number of cases (1,291) reported for the 4 weeks ended December 27 being 91% of the median for the preceding 5 years. The median was represented by the 1946 incidence (1,416 cases). In the South Atlantic and Mountain sections the numbers of cases were larger than might be expected normally, but in other sections the incidence either closely approximated the median or fell below it. After a slight break in the downward trend of this disease in 1944 and 1945 the incidence has started down again and the total cases for the year 1947 will be the lowest ever reported.

Meningococcus meningitis.—The number of cases (224) of meningococcus meningitis was 90% of the 1946 incidence for the corresponding 4 weeks and 45% of the median for the preceding 5 years. The number of cases was relatively low in all section of the country, and for the country as a whole the incidence was the lowest since 1941 when 143 cases were reported

during the corresponding 4 weeks. States reporting the largest number of cases were California 19, Pennsylvania 18, Texas 15, New York and Oklahoma 14 each, Connecticut and Ohio 11 each, and North Carolina 10. No other State reported more than 7 cases.

Poliomyelitis.—For the 4 weeks ended December 27 there were 360 cases of poliomyelitis reported. There were 688 cases reported during the corresponding 4 weeks in 1946 and the median for the preceding 5 years was 932 cases. The incidence remained relatively high in a few States in the East North Central, South Atlantic, and Mountain sections, but in other sections the number of cases occurring was either about normal or was considerably below the normal seasonal expectancy. After 4 years of unusually high incidence this disease has returned to a more normal level and the number of cases reported for the year 1947 will no doubt be the lowest since 1942 when approximately 4,200 cases were reported.

Scarlet fever.—The incidence of this disease was the lowest on record for this period. The number of reported cases (7,167) was 87% of the number reported in 1946 and 65% of the 1942-46 median for the corresponding 4 weeks. The number of cases in each geographic section was considerably below the normal median expectancy. The year 1947 was the lowest year on record for this disease, with a total of about 83,000 cases as compared with a 5-year median of approximately 140,000 cases.

Smallpox.—For the 4 weeks ended December 27 there were 13 cases of smallpox reported as compared with 7 for the corresponding weeks in 1946 and a median of 28 cases for the preceding 5 years (1942-46). The cases were confined to 3 sections of the country, the East North Central (4 cases), West North Central (7 cases), and the South Atlantic (2 cases). For the first time since September 1946 the incidence for a current 4-week period was higher than during the same weeks in the preceding year. While the current incidence was slightly above the 1946 figure it was lower than in any preceding year for which data are available in this form. For the year 1947 a total of 170 cases of smallpox was reported as compared with a median of 386 cases for the preceding 5 years.

Mortality, All Causes

For the 4 weeks ended December 27 there were 38,570 deaths from all causes reported to the National Office of Vital Statistics by 93 large cities. The median number for the corresponding period in the years 1944-46 was 36,425 deaths. The number of deaths was higher than the median for the 3 preceding years in the first 3 weeks of the current period, but during the last week of the period the number of deaths was 11% below the 3-year median.

BOOK REVIEWS

CONGENITAL MALFORMATIONS OF THE HEART, Helen B. Taussig, M.D., $10, 618 pages including 46 diagrams in color and 177 other figures. The Commonwealth Fund, New York, 1947.

Seldom has a monograph or text been so eagerly awaited as Dr. Taussig's summation of her observations of congenital malformations of the heart, and rarely has a book so completely justified the pre-publication interest it evoked as does this. Dr. Taussig's investigations of congenital cardiac anomalies have for some years been directed toward increasing clinical knowledge of these conditions and have been related to Dr. Maude Abbott's classical pathologic studies.

All the clinical types of congenital heart disease are here discussed in detail. The embryologic aberration is pointed out. With the nature of the anatomic deformity established, the inevitable alterations in circulatory dynamics are then considered and the conclusions in each instance are presented in diagrammatic form. These diagrams are, indeed, a major contribution of the work since they supply easily understandable pictorial summaries of the functional changes necessitated by any given structural abnormality. The clinical findings, the prognosis, and the therapy are all presented with lucidity, logic and precision; and are illustrated with numerous case studies, roentgenograms, anatomic sketches, and the physiologic diagrams. Most of the case studies are from the author's own extensive series, but some other case reports are utilized when the discussion so requires. Not only the commoner types of congenital anomalies of the heart and great vessels are discussed, but the rarer forms which must be considered in differential diagnosis are also presented in detail.

Throughout the book emphasis is placed chiefly on diagnostic technics available to all clinicians: physical examination, roentgenography and electrocardiography; and a logical system of diagnosis is developed which should enable the physician to avail himself of the author's wide experience and careful observation. Relatively little space is devoted to the complicated technics of cardiac catheterization and angiocardiography not only because of the author's professed lack of experience with these methods but also because they are, in most instances, unnecessary for diagnosis and are unavailable except in a few of the most specialized medical centers.

Even though large numbers of cases are discussed, this is in no sense a statistical summary. The cases are chosen to illustrate and prove the principles presented. The text is concise, clear, and never verbose and makes for stimulating reading. The physical characteristics of the book meet the same high standard as the text. The type is clear and readable, the paper good, the reproductions of roentgenograms and photographs are extraordinarily clear.

JAMES GOODFRIEND

CHILD HEALTH. Edited by Alan Moncrieff, M.D., F.R.C.P. and William A. R. Thomson, M.D. Price, 14s. net., 254 pages, 12 figures. Eyre & Spottiswoode, Ltd., London, W. C. 2, 1947.

A series of 22 articles by individual authors, dealing with the major problems of ill health in childhood from the more positive attitude of the maintenance of health and describing the numerous health services available for the care of children. Most of the articles had been published previously. The editorial preface outlines the philosophy of the book as follows: "Preventive medicine as applied to children includes not only measures adopted for the protection of the completely healthy child (as in diphtheria prophylaxis) but also the important task of preventing minor maladies from becoming major illnesses. Moreover, there are certain diseases of childhood, such as rheumatism and tuberculosis, in which the social implications involve much of the machinery of the local authority services. These disorders, if they are to become the care of the general practitioner, necessitate on his part a wide knowledge of the services available and how they may be utilized to the best advantage. This volume therefore attempts to give the information which it is thought that general practitioners will need for the best appreciation of the Child Health Services."

The book is one of a group of *The Practitioner Handbooks*, edited by the late Sir Humphry Rolleston and Alan Moncrieff, M.D. for the general practitioner. The articles are short, condensed, pointed, uniform in reading, and diversified. There is no bibliography, but it is not missed in this type of book. The book should be of great interest to pediatricians and should be read by everyone concerned with child health, including not only general practitioners, but also public health planners and administrators, nurses, nutritionists, teachers, and others. It is forward looking in its viewpoint, pointing the way toward the solution of the major problems in child health and care.

HUGH MCCULLOCH

HUMAN TORULOSIS. Leonard B. Cox and Jean Tolhurst. Price 25s., 149 pages. Melbourne University Press, Melbourne, Australia, 1946.

Interest in the pathogenic mycoses has been steadily increasing during the past three decades, particularly in those which cause disease of the central nervous system, lungs and bones. Pediatricians are especially concerned with certain varieties, notably coccidioidomycosis and histoplasmosis, which may at times be confused with tuberculosis. Torulosis is another example which deserves close attention. Interest was first attracted to it in this country in 1916 by Stoddard and Cutler whose work appeared as one of the early monographs of the Rockefeller Institute. Their study was based on two cases, both with meningitis, and included experimental reproduction of the disease in animals. Four other cases were discovered by them in the literature. Since then a number of original studies and reports have brought the total number of authenticated cases to slightly over a hundred; the present study from Australia adds 13 more, the largest single series on record, and offers an excellent basis for a new and comprehensive consideration of the disease.

A comprehensive review of the literature is followed by detailed descriptions of the authors' own cases, 8 with autopsy (2 patients were still living). In all but one, central nervous symptoms constituted the presenting complaints, but the authors emphasize the fact that one or more of various other systems are quite regularly involved; and that, contrary to general belief, meningitis in occasional cases is absent or minimal. Pulmonary involvement is frequent; lymphadenitis is not uncommon and has certain similarities with Hodgkin's disease. A number of cases of cutaneous torulosis have also been reported, and less frequently bones and joints have been the seat of lesions. Generalized torulosis, defined by the authors as involvement of three or more types of tissue—including those already mentioned and kidneys, spleen, adrenals, pancreas, etc.—was observed in 10 of the proposed cases. Differential diagnosis is carefully considered.

The microbiology of the organism is discussed in great detail: its morphology, cultural characteristics, resistance to heat, viability and antigenic behavior. The difficulties of classification—familiar to all students of mycology—are illustrated by the observations cited that same strains have been observed to form mycelia and others to sporulate. Infection can be produced in mice, rats, guinea pigs, and rabbits.

The pathology of the disease both in man and in experimental animals is fully detailed, and there is a discussion of the sources and routes of infection. The authors believed that the usual initial portal of entry is the lung, that it may sometimes be the skin, and that dissemination from the initial focus which may be late can occur either through the lymphatics or the blood stream. No instance of cross infection has been observed. Torulae pathogenic for mice have been recovered several times from various sources in nature. The organism can remain viable for as long as 10 months in dried cerebrospinal fluid kept at room temperature.

No effective treatment has been found.

This monograph is thorough, thoughtful, well written and authoritative; as a reference volume it will be indispensable to clinicians, pathologists, investigators and others interested in the subject with which it deals. There are a number of excellent reproductions of roentgenograms and of gross and microscopic tissue sections. The printing and format are good. The bibliography contains 134 titles and the index appears to be adequate.

HAROLD K. FABER

ATLAS OF CARDIOVASCULAR DISEASES. Irving J. Treiger, M.D., $10, 180 pages, illustrated with 69 plates containing 244 illustrations, 11 in color. C. V. Mosby Company, St. Louis 3, 1947.

This book represents an ambitious attempt to portray briefly typical clinical, roentgenographic, electrocardiographic and pathological findings in various types of cardiac disease. The attempt is not altogether successful because of occasional oversimplification and omission of important data. For example, although the author stresses the importance of oblique views of the heart in the roentgenogram, these are presented in only three instances; and, although the electrocardiographic findings in pericarditis are discussed in the text and in the summary, no tracings are presented. Other similar deficiencies are present in the book even though space is sometimes devoted to other material which seems extraneous.

The most serious deficiency from the pediatrician's view point lies in the very inadequate coverage of congenital anomalies of the heart and great blood vessels. Although one of the book's seven sections is devoted to this group of conditions, very serious omissions are made. The plates on coarctation of the aorta and patent ductus arteriosus consist only of photographs of autopsy specimens and diagrams with no accompanying roentgenograms or electrocardiograms. The plate concerned with the tetralogy of Fallot contains a single roentgenogram which is not very characteristic and which is probably incorrectly, certainly incompletely, interpreted. The film apparently shows a case of tetralogy of Fallot with the additional anomaly of a right aortic arch rather than merely dextroposition of the aorta (as stated), and no importance is attached to the excessively clear lung fields. In the discussion of this condition no mention is made of the fact that decreased pulmonary blood flow is an important factor leading to cyanosis. Since surgical treatment of tetralogy of Fallot is based on increasing the pulmonary blood flow and since localization of the aortic knob is essential in determining the site of surgical approach, these must be considered serious errors. The existence of anomalous vascular rings, the other congenital anomaly amenable at the present time to surgical treatment, is not even mentioned.

For the remainder of the book, it may be said that a unified presentation of the various findings in typical cases of cardiac disease may be of value for quick references, but it is obvious that such a brief presentation can offer only the most superficial coverage of the subject and that for detailed study more complete works are required.

JAMES GOODFRIEND

CUSHNY'S PHARMACOLOGY AND THERAPEUTICS. Arthur Grollman, Ph.D., M.D., and Donald Slaughter, M.D. 13th Edition. $8.50, 868 pages, 74 engravings. Lea & Febiger, Philadelphia 6, 1947.

The preceding four editions of this book were prepared by Professor C. W. Edmunds and Professor J. A. Gunn, the twelfth edition appearing in 1944. Professor Edmunds has died, and Professor Gunn has resigned which necessitated the appointment of the present editors. In addition to the changes resulting from this, there are also those made necessary by the many notable advances in the field of chemo- and antibiotic therapy, endocrinology, and the vitamins. Changes introduced by the publication of the twelfth decennial revision of the Pharmacopeia of the United States, 1942, and the British Pharmacopeia, 1932, have been incorporated in the present edition. (*Ed. Note:* The thirteenth decennial revision of the Pharmacopeia of the U.S. has been published in 1947.)

The present authors have shifted the approach to the subject of pharmacology from the classic form of experimental study to an emphasis on the scientific basis of therapeutics.

COMMON CONTAGIOUS DISEASES. Philip Moen Stimson, M.D. Fourth Edition. $4.00, 503 pages, 67 illustrations and 8 plates, 6 in color. Lea & Febiger, Philadelphia 6, 1947.

A period of seven years since the last edition has required not only the usual changes in text, but a new chapter on the use of chemo- and antibiotic therapy for the common contagious diseases and an essentially new chapter on poliomyelitis.

STANDARD METHODS OF THE DIVISION OF LABORATORIES AND RESEARCH OF THE NEW YORK STATE DEPARTMENT OF HEALTH, August B. Wadsworth, M.D., with a foreword by Gilbert Dalldorf, M.D. Third Edition. $10.00, 990 pages. The Williams & Wilkins Co., Baltimore 2, 1947.

This edition marks the change in editorship from Dr. Augustus B. Wadsworth to Dr. Gilbert Dalldorf. Numerous changes have been made in practically all sections. These are in keeping with the important developments in the field of chemotherapy. A useful and authoritative reference.

REPORT OF THE COMMITTEE ON THERAPEUTIC PROCEDURES FOR ACUTE INFECTIOUS DISEASES AND ON BIOLOGICALS OF THE AMERICAN ACADEMY OF PEDIATRICS. John A. Toomey, M.D., Chairman. 25 cents, 84 pages. American Academy of Pediatrics. Evanston, Ill., 1947.

A complete revision with a new chapter on Quarantine and Isolation. Chapter 2 on Chemotherapy and Chapter 3 on Antibiotic Agents have been extensively revised. An authoritative statement of the most recent and acceptable information.

DISEASES OF CHILDREN, Volume 1. Edited by Donald Paterson, M.D., F.R.C.P. and Alan Moncrieff, M.D., F.R.C.P. Fourth Edition. $9.00, 771 pages, 154 figures and 45 tables. The Williams & Wilkins Co., Baltimore 2.

The appearance of the Fourth Edition of this standard text marks the assumption of new editors throughout. There is a relatively large list of individual contributors, each one writing on a specialized field. The new material throughout the various sections brings the information up to date. This is a most useful English text and should find extensive reception in this country.

ADVANCES IN PEDIATRICS, Volume 2. Editorial Board: S. Z. Levine, M.D.; Allan M. Butler, M.D.; L. Emmett Holt, Jr., M.D.; A. Ashley Weech, M.D. $6.75. 409 pages. Interscience Publishers, Inc., New York 3, and London, 1947.

The appearance of this volume marks the resumption of publication under the new Editorial Board. It is made up of articles by individual authors as follows: Etiology of Congenital Malformations, by Josef Warkany, Cincinnati; Acute Infectious Lymphocytosis, by Carl H. Smith, New York; Role of Fluorine in Prevention and Treatment of Dental Caries, by H. Trendley Dean, Bethesda, Md.; The Treatment of Purulent Meningitides, by Hattie E. Alexander, New York; Chemotherapy: Penicillin, Sulfonamides, Streptomycin, and Tyrothricin, by Paul György and Henry F. Lee, Philadelphia; Atypical Pneumonia, by John H. Dingle, Cleveland; Endocrine and Other Factors Determining the Growth of Children, by Nathan B. Talbot, and Edna H. Sobel, Boston; Virus Diarrhea, by Katharine Dodd, Cincinnati; Prematurity, by Harry H. Gordon, New York; The Genesis of Physiologic Hyperbilirubinemia, by A. A. Weech, Cincinnati; Prevention of Recurrences of Rheumatic Fever, by Ann G. Kuttner, Irvington, N.Y. These articles are essentially specialized reviews of assigned subjects, each by a specialist in the particular field. Editing has been carefully done and the text is uniform in its reading.

INFANT NUTRITION. P. C. Jeans, M.D. and Williams McKim Marriott, M.D.* Fourth Edition. $6.50, 516 pages, 36 illustrations. C. V. Mosby Co., St. Louis 3, 1947.

New edition after six years. The increasing knowledge of the science of nutrition has resulted in many changes and additions applicable to infant nutrition. The book has been thoroughly revised and many sections have been rewritten. This remains an essential textbook on infant nutrition.

HANDBOOK OF COMMUNICABLE DISEASES. Franklin H. Top, M.D., M.P.H. Second edition. $9.50, 992 pages, 95 illustrations, and 13 Color Plates. C. V. Mosby Co., St. Louis 3, 1947.

* Deceased.

The essential changes in this edition, which appears after a period of six years, consist in the additional chapters introduced as follows: Coccidioidomycosis by Charles E. Smith; Rheumatic Fever by David D. Rutstein; Primary Atypical Pneumonia by Theodore J. Abernethy; Epidemic Diarrhea of the Newborn by G. D. Cummings; Infectious Hepatitis by Thomas Francis, Jr.; "Chancroid," "Lymphogranuloma Venereum," and "Granuloma Inguinale" by Loren W. Shaffer; Ophthalmia Neoantorum by Warren E. Wheeler; "Epidemic Keratoconjunctivitis" and "Leptospiral Jaundice" by Joseph G. Molner; Ringworm of the Scalp by Joseph G. Molner and Loren W. Shaffer; Trachoma by Parker Heath; and Mononucleosis, Infectious by Franklin H. Top. The three chapters on Influenza, Malaria, and Rickettsial Diseases have been entirely rewritten. Numerous other changes have been introduced.

EDUCATION AND HEALTH OF THE PARTIALLY SEEING CHILD. Winifred Hathaway. Revised Edition. $2.50, 216 pages and 9 figures. Columbia University Press, New York 27, 1947.

A new edition after four years. New photographs and revision of statistical data, information on lighting standards, and equipment have been added. An important book in the field of school health. The author is Associate Director of the National Association for the Prevention of Blindness.

FUNDAMENTALS OF IMMUNOLOGY. William C. Boyd, Ph.D. Second Edition. $6.00, 519 pages, 50 illustrations. Interscience Publishers, New York 3, 1947.

New edition after four years. Numerous minor changes have been made including the addition of summaries to all chapters. This makes for convenience in rapid reference. The author has adhered to his purpose of the first edition in presenting only essential information with no attempt to be exhaustive. An extensive bibliography should help meet this requirement.

THE POCKET BOOK OF BABY AND CHILD CARE. Benjamin Spock, M.D. $.35, 517 pages, Illustrations by Dorothea Fox. Pocket Books, Inc., New York 19, 1946.

This popular book in reduced size should meet with popular approval. The price has been reduced correspondingly.

NEWS AND ANNOUNCEMENTS

Postgraduate Education in Pediatrics in Louisiana: Louisiana State University School of Medicine and the Louisiana State Department of Health jointly have inaugurated a program of graduate instruction in pediatrics for the practicing physicians of the state. Dr. Sidney S. Chipman has joined the faculty of the School of Medicine as Director of the program. He has been appointed Associate Professor of Pediatrics and, at the same time, Associate in Pediatrics in the State Department of Health.

The great need for an organized program of educational opportunities for the practicing physician calls for major responsibility of the State University School of Medicine in such an endeavor. Experiences in different parts of the country, however, have brought about little uniformity of opinion regarding the content of program or methods of approach.

Some centralized training at the Medical School is being planned but it is realized that many difficulties are involved in the attendance of practicing physicians, particularly from rural areas. Louisiana is fortunate in having several state-operated general hospitals in different sections of the state. With this in mind a series of conferences and round table discussions have been arranged in various areas of the state. Ward rounds in the local hospitals and informal discussions in the physicians' office will also be part of the project. To date the response to that portion of the program which has been initiated is most gratifying.

It is planned in Louisiana to use a variety of methods of approach and it is hoped that within a few years it will be possible to accumulate sufficient experience to provide at least some of the answers to these problems.

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Graduate Course in Pediatrics: Michael Reese Hospital will conduct a postgraduate course in pediatrics May 3 to 15. The course is to be presented in two one-week sections on (1) The Full Term and Premature Infant in Health and Disease, and (2) Diagnostic and Therapeutic Measures in General Pediatrics. Tuition is $50 per section. Write Dr. Samuel Soskin, 29th Street and Ellis Avenue, Chicago 16, Ill., for information.

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Dr. Martha Eliot Receives Annual Parents' Magazine Medal: Dr. Martha Eliot, Associate Chief of the U. S. Children's Bureau, received the Parents' Magazine Medal for Outstanding Service to Children for 1948.

Recently, on loan to the United Nations, Dr. Eliot has made trips to Western and Central Europe in her capacity as Chief Medical Consultant of the International Children's Fund. Dr. Eliot has been particularly active in developing the nation's program for the care of crippled children; she is the first woman ever to be elected as President of the American Public Health Association.

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American Board of Pediatrics Certifies Fifty: Below are listed names of candidates certified by the American Boardof Pediatrics following the examinations at Dallas, Tex., on December 5, 6 and 7, 1947. Pediatricians now holding certificates number 2698.

Report of the examinations held in Philadelphia, January 9, 10 and 11, will appear next month.

Further examinations by the Board will be held in Cleveland, O., on April 23, 24 and 25; in Chicago, Ill., on June 25, 26 and 27; and in Seattle, Wash., at the Areal Meeting of the American Academy of Pediatrics, September 13, 14 and 15.

Certificate No.	*Name*	*Address*
2649	A. L. Alfieri, M.D.	3427 Cedar Springs, Dallas, Tex.
2650	Herbert I. Arbeiter, M.D.	5231 Hohman Ave., Hammond, Ind.
2651	Olive Lundgren Bateman, M.D.	2426 Clinton Ave. So., Apt. E-10, Minneapolis, Minn.
2652	Edward L. Binkley, Jr., M.D.	Children's Hospital, 19th Ave. at Downing, Denver, Colo.
2653	James F. Bosma, M.D.	Dept. of Peds., Univ. Hosps., Minneapolis 14, Minn.

Certificate No.	*Name*	*Address*
2654	Frederic Gerard Burke, M.D.	Children's Hosp., 13th & W Sts., Washington, D.C.
2655	Benjamin P. Clark, M.D.	948 Forrest Ave., Gadsden, Ala.
2656	Michael Crofoot, M.D.	1407 Medical Arts Bldg., Omaha, Neb.
2657	Jack Merton Docter, M.D.	738 Broadway, Seattle 22, Wash.
2658	Herbert Burrough Ellis, Jr., M.D.	705 East Palace Ave., Santa Fe, N.M.
2659	Isadore M. Epstein, M.D.	525 Montana St., El Paso, Tex.
2660	Jacob S. Fine, M.D.	4402 Lemmon Ave., Dallas, Tex.
2661	Leo J. Flax, M.D.	858 Metropolitan Bldg., Denver 2, Colo.
2662	Robert Lasley Forney, M.D.	1930 Truxton Ave., Bakersfield, Calif.
2663	Louis S. Frank, M.D.	1200 North Walker, Oklahoma City, Okla.
2664	Robert Allen Gardner, M.D.	3720 Fannin St., Houston, Tex.
2665	Leo J. Geppert, M.D.	Ped. Clinic, Annex III, Brooke Gen. Hosp., Ft. Sam Houston, Tex.
2666	James Goodfriend, M.D.	500 South Kingshighway, St. Louis 10, Mo.
2667	Hyman Harry Gordon, M.D.	3303 W. Lawrence, Chicago, Ill.
2668	Arthur M. Grossman, M.D.	6333 Wilshire Blvd., Los Angeles 36, Calif.
2669	Harvey Allan Hatch, M.D.	Hatch Clinic, P.O. Box 1101, Idaho Falls, Idaho
2670	Jean Holowach, M.D.	10049—106 St., Edmonton, Alberta, Can.
2671	Mildred R. Jackson, M.D.	1150 North State St., Chicago, Ill.
2672	Charles Kaplan, M.D.	1305 East 43rd St., Seattle 5, Wash.
2673	James M. Kennedy, Jr., M.D.	602 West University, Urbana, Ill.
2674	Isadore Lerner, M.D.	5946 West Cermak Rd., Cicero 50, Ill.
2675	Frances Marshall Love, M.D.	3617 Maple Ave., Dallas, Tex.
2676	Niels L. Low, M.D.	744 Main St., Racine, Wis.
2677	George C. McCullough, M.D.	Employees' Hospital, Fairfield, Ala.
2678	Jean L. McMahon, M.D.	326 Republic Bldg., Denver, Colo.
2679	Victor Charles McPhee, M.D.	Med. Bldg., Bush and Hyde Sts., San Francisco, Calif.
2680	Isidore Marx, M.D.	420 Lincoln Rd., Miami Beach, Fla.
2681	Irvin H. Moore, M.D.	Dept. of Peds., Univ. of Minn., Minneapolis, Minn.
2682	Fe del Mundo, M.D.	North General Hospital, Manila, Philippines
2683	Norman W. Murphy, M.D.	901 East Columbia, Seattle, Wash.
2684	Mildred A. Norval, M.D.	c/o Mayo Clinic, Rochester, Minn.
2685	Paul P. Pierce, M.D.	203 So. Broadway, Alton, Ill.
2686	John Ray Powers, M.D.	Third St., Roumain Bldg., Baton Rouge, La.
2687	Raymond R. Rembolt, M.D.	206 South 13th St., Lincoln, Neb.
2688	Francis Henry Reynolds, M.D.	1010 Republic Bldg., Denver, Colo.
2689	Cathryn C. Rotondo, M.D.	2005 Longest Ave., Louisville, Ky.
2690	Herschel J. Rubin, M.D.	1619 East 15th St., Tulsa, Okla.
2691	Henry Norris Russell, Jr., M.D.	1002—9th St., Greeley, Colo.
2692	Mary Louise L. Scholl, M.D.	Columbus Children's Hosp., Columbus, Ohio
2693	Carol Kander Smith, M.D.	5621—41st Ave. So., Minneapolis, Minn.
2694	Sinclair S. Snider, M.D.	2017 W. 95th St., Chicago, Ill.
2695	Alma Marie Sullivan, M.D.	2000 Tulane Ave., New Orleans, La.
2696	Donald Lionell Thurston, M.D.	500 So. Kingshighway, St. Louis, Mo.
2697	James Neal Walker, M.D.	1812 Tremont St., Ft. Worth 7, Tex.
2698	Jerome Anderson Weaver, M.D.	5 North 55th St., Birmingham 6, Ala.

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Announcements: The next meeting of the Society for Pediatric research will be held May 4 and 5, 1948 at the Seaside Hotel, Atlantic City, N.J. Dr. Robert Ward, 26th St. and First Ave., New York 16, N.Y., is Secretary for the Society.

Dr. Alton Goldbloom of Montreal, Quebec, Canada, recently became full professor of pediatrics at McGill University.

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Service News: Dr. George M. Lyon, formerly of Huntington, W.Va., has been released from naval service which he entered in April 1942. Dr. Lyon, who is now in Washington, D.C., with the Veterans Administration as Chief, Radioisotope Section, received from the President the Gold Star in lieu of the second Legion of Merit. The citation read in part: for exceptionally meritorious conduct in the performance of outstanding services to the government as Safety Officer for Joint Task Force One during operation Crossroads from Jan. 11 to Nov. 1, 1946. Responsible for the preparation of the safety plan for the Task Force, he also continually advised the Task Force Commander as to safety measures for protection against normal and abnormal hazards incident to the detonation of two atomic bombs and the inspection of target ships. The adequacy and thoroughness of the safety measures prescribed by Captain Lyon and carried out under his general supervision were evidenced by the safety record achieved during the operation. As training officer for the Radiological Safety School established by the Task Force Commander, Captain Lyon contributed to the success of the program and to the beneficial effects extending to the post-Crossroads activities of the Army and Navy in the problem of radiologic safety. His performance of an exacting assignment reflects the highest credit on the United States Naval Service.

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The following two Academy fellows have recently been discharged from service: Dr. John R. Gilmour, East Orange, N.J., Navy; and Dr. Henry C. Niblack, Seligman, Mo., UNRRA.

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Deaths: Dr. George M. Cultra of Amarillo, Tex., one of the early fellows of the Academy, died of a cerebral accident Sunday, January 4, 1948.

Dr. Marvin Israel of Buffalo, N.Y., died January 9, 1948 of coronary thrombosis.

One of the Academy fellows in service, Dr. Gilbert S. Osincup of Orlando, Fla., died November 26, 1947.

We have recently been notified that Dr. Talbot A. Tumbleson of Beaumont, Tex., who was in service, died March 14, 1946.

Dr. Noel C. Womack of Pocahontas, Miss., who was voted Emeritus Fellowship at the Dallas meeting of the Academy, died December 27, 1947.

INTERNATIONAL NEWS AND REPORTS

The financial statement, submitted by the treasurer, of the Fifth International Congress of Pediatrics which was held in New York City on July 14, 15, 16, and 17, 1947 is published so that the pediatricians of the United States, who contributed so much to the success of the Congress, may know how their gifts of money and of time were used.

CONDENSED FINANCIAL STATEMENT OF FIFTH INTERNATIONAL PEDIATRICS CONGRESS

Receipts

Subsidies from Pediatric Organizations in U.S.A.	
American Academy of Pediatrics (U.S.A. members only)	$ 18,855.00
American Medical Association (Pediatric Section)	3,000.00
American Pediatric Society	1,000.00
Society for Pediatric Research	75.00
Contributions from Philanthropic Foundations and individuals	40,075.00
Contributions from Industry	60,100.00
Revenue from Registration fees	55,005.00
Total Receipts	$178,110.00

Expenses

Subsidies to 107 foreign delegates	$ 97,061.21
Promotional Expenses	2,244.64
Secretarial and office salaries	4,602.36
Printing, stationery, postage, telephone, cables	9,444.52
Badges	2,430.50
Rental of space	8,000.00
Translations and translation equipment	5,197.98
Exhibit (expenses other than rental)	10,452.92
Reception, teas, luncheon to official delegates	8,000.00
Banquet	16,000.00
Steamer Excursion	5,118.84
Post-Congress Tours	1,836.02
Miscellaneous expenses	7,721.01
Total Expenses	$178,110.00

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The National Foundation for Infantile Paralysis has announced it would sponsor the First International Poliomyelitis Conference at the Waldorf-Astoria Hotel in New York July 12 to 17, 1948.

The program will include scientific and technical papers on research and treatment of poliomyelitis to be presented by professional authorities in the field from this country and abroad. In addition, there will be panel discussions on the various subjects.

It was announced also that Conference headquarters have been established in the Waldorf-Astoria Hotel under direction of Stanley E. Henwood, of Chicago, who has been appointed Executive Secretary of the Conference. Arrangements for the Conference will be directed from there by Mr. Henwood.

The program for the Conference is being arranged by a seven-member advisory board, which includes: Irvin Abell, M.D., Morris Fishbein, M.D., David P. C. Lloyd, Ph.D., Kenneth Maxcy, M.D., Rustin McIntosh, M.D., Frank R. Ober, M.D., and Thomas M. Rivers, M.D.

In addition to the sessions, there will be a scientific exhibit section, demonstrations of muscle testing and treatment procedures, and a film program. Coordinating this phase of the conference will be an advisory committee of Thomas G. Hull, Ph.D., Director of Scientific Exhibits of The American Medical Association, and Charles F. Branch, M.D., Director of Scientific Exhibits of The American College of Surgeons.